STATE OF COLORADO

Carter - DNR, Jocelyn <jocelyn.carter@state.co.us>

Munroe Gypsum TR3 Adequacy Review 2

Mike Golliher <MGolliher@petelien.com> Fri, Mar 15, 2024 at 12:59 PM
To: "Carter - DNR, Jocelyn" <jocelyn.carter@state.co.us>
Cc: "Ebert - DNR, Jared" <jared.ebert@state.co.us>, "Lennberg - DNR, Patrick" <patrick.lennberg@state.co.us>

Hello Jocelyn,

Exhibits C, D, E and F have been revised to address Adequacy Review 2.

Please let me know if any additional review is needed.

Thank you, Mike

Michael Golliher

Technical Director of Mine Planning

Pete Lien & Sons Inc.

Office: (605) 939-2719

Mobile: (605) 209-2619

mgolliher@petelien.com

From: Carter - DNR, Jocelyn <jocelyn.carter@state.co.us>
Sent: Friday, January 12, 2024 3:56 PM
To: Mike Golliher <MGolliher@petelien.com>
Cc: Ebert - DNR, Jared <jared.ebert@state.co.us>; Lennberg - DNR, Patrick <patrick.lennberg@state.co.us>
Subject: [ExternalSender] Munroe Gypsum TR3 Adequacy Review 2

Hello Mike,

Attached is the adequacy review for the TR3 submitted 3 November 2023. Please review the letter and provide a response. The decision date is currently scheduled for 17 January 2024, next Wednesday, please send a request for an extension before then in order to provide enough time for proper review and response.

Sincerely,

Jocelyn

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2 attachments

20240315 M-1977-002-HR_Munroe_TR3_20240112 CO_DRMS Response.pdf
1435K

20240315 M-1977-002-HR_Munroe_TR3_Exhibits_C_D_E_F.pdf
15581K

PETE LIEN & SONS, INC.

MAILING ADDRESS: P.O. BOX 440 RAPID CITY, SD 57709-0440 PH. 605-342-7224
PHYSICAL ADDRESS: 3401 UNIVERSAL DR. RAPID CITY, SD 57702 FX. 605-342-6979

March 15, 2024

Colorado Division of Reclamation, Mining and Safety
Room 215
1001 E 62nd Avenue
Denver, Colorado 80216

Re: Pete Lien & Sons, Inc.; Mining Permit No. M-1977-002 HR; Munroe Gypsum; Technical Revision Request to formalize Affected Areas and increase the Total Disturbed Area at any one time. Clarification

Permittee submits the following items for further clarification based on the 12 January 2024 letter from Jocelyn Carter, Environmental Protection Specialist.

Rule 6.4.3 – Exhibit C – Pre-mining and Mining Plan Map:

1) Revise map to indicate the correct "Current Released Area".name of the permittee,
Exhibit C map has been corrected to show the reclaimed area that has not been released.

2) Revise Exhibit C map to include the addition of 39 drill holes within the permit boundary.
Locations of the 39 drill holes have been added to Exhibit C.

Rule 6.4.4 – Exhibit D – Mining Plan:

3) A phase or stage schedule for Area B of the affected lands is required in Exhibit D and reflected in Exhibit C.

A stage schedule of "Phase – Current " has been added to Exhibit C and is described in Exhibit D. Gypsum in this area is expected to be depleted sometime between 2025 and 2026.

4) Please commit to providing a copy of the agreement with the landowner requesting the widened "ranch" road and/or "spur" roads remain unreclaimed.
The permittee agrees to obtaining an agreement with the landowner requesting that the "ranch" and/or "spur" roads remain unreclaimed prior to requesting a release of the associated land. A statement to that effect has been added to Exhibit D.

PETE LIEN & SONS, INC.

MAILING ADDRESS: P.O. BOX 440 RAPID CITY, SD 57709-0440 PH. 605-342-7224
PHYSICAL ADDRESS: 3401 UNIVERSAL DR. RAPID CITY, SD 57702 FX. 605-342-6979

5) Revise Exhibit D to include information about the 39 drill holes approved in TR-2.
A table has been inserted into Exhibit D that includes a timetable, size, depth and locations of the drill holes.

Rule 6.4.5 – Exhibit E – Reclamation Plan:

6) In Exhibit E, make a correction to refer to Exhibit F instead of Exhibit E.
The correction has been made.

7) Revise Exhibit E to include reclamation of the 39 drill holes.
Paragraph 11 has been added to provide an update on the drilling program and provide a plan for reclamation.

Rule 6.4.6 Exhibit F – Reclamation Plan Map:

8) Revise map to show topography with sufficient contour lines and the rate of slope of all reclaimed areas in accordance with Rule 6.4.5(a).
Topographic lines to portray the direction and rate of slope on 25 foot intervals have been added.

9) Revise map to portray the correct category for of the affected land in Area A.
The area that has been reclaimed but not released has been identified on Exhibit F.

Rule 6.4.12 – Exhibit L – Reclamation Costs:

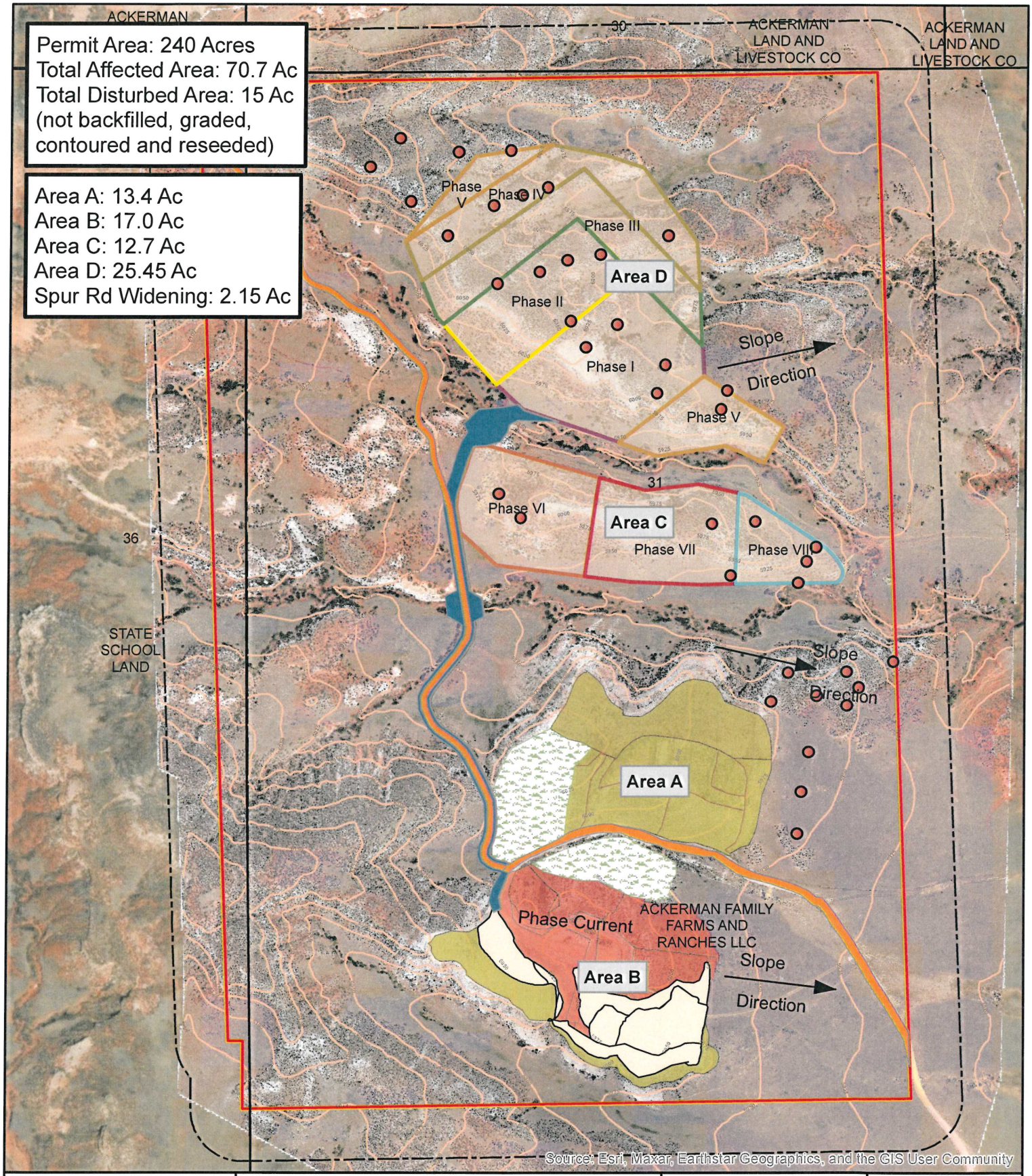
10) Provide an updated reclamation cost estimate.
The permitted accepts the reclamation cost estimate provided by the Division and incorporates it into this Technical Revision.

If there are any questions regarding this submittal or if additional information is required, please contact me at (605) 939-2719 or by email at mgolliher@petelien.com.

Respectfully,

Michael Golliher
Technical Director of Mine Planning
Pete Lien & Sons, Inc.

Attachments included: Munroe Quarry Exhibits C, D, E, F, Reclamation Cost Summary Work



Munroe Quarry

Exhibit C- Pre-Mining and Mining Plan Map of Affected Lands
Location: NW1/4 & N1/2SW1/4 Sect. 31 T11N R69W
Larimer County, CO
112 Permit Munroe Quarry, Mine Plan Revision
Background: World Imagery

Legend

- 25 ft Contours
- Ranch Road
- Current Reclaimed Area
- Current Disturbed Area
- Spur Road Widening
- Backfilled
- Mine Development Phase I
- Mine Development Phase II
- Mine Development Phase III
- Mine Development Phase IV
- Mine Development Phase V
- Mine Development Phase VI
- Mine Development Phase VII
- Mine Development Phase VIII
- Surface Owners
- 200 Ft Buffer
- Revised Affected Area Boundary
- Permit Boundary
- PLS
- Current Released Area
- Section Lines CO
- 2023 Munroe Exploration

N W E S

0 250 500 Feet

Last Revised:3/14/2024
Drawn by: THutchens
GIS Website
Surveyed: None

EXHIBIT D – MINING PLAN *(TR-3 revisions in Italics)*

MUNROE QUARRY (M-77-002HR)

Larimer County, CO

Safety & Environment Office Rapid City, SD 57709-0440 **(605) 342-7442 FAX 394-6979**

Mining will be a continuation of the existing 9.9 acre mining operation, which has been in existence since 1977.

1. Topsoil cover (estimated four inches or less) will be removed by a bulldozer and stockpiled for future reclamation. Stockpiles will be protected, as needed, by seeding or use of cover material or agents and will be located in previously mined areas not yet reclaimed.
2. Dolomitic shale will be removed by bulldozer or drilling and blasting. The material (up to 35 feet thick) will be hauled to previously mined areas and used for backfilling.
3. Gypsum will be extracted from a bed of 25-35 feet thickness by drilling and blasting.
4. Shotrock gypsum will be used as a feedstone for a portable crusher, to be placed with stockpiles of feedstone and crushed product in a pit area where material has been previously extracted but not yet reclaimed.
5. Crushed gypsum in various sizes will be stockpiled and then loaded by wheeled loader into over-the-road haul trucks and trailers.
6. *Typically, and* ~~D~~ depending on thickness of the bed, the area disturbed during each mining season will be approximately one-half to one-acre.

Up to 5 acres of additional development may be required to transition from Mining Area B to Mining Area D.

Normally, the gypsum bed will be mined in a single bench, although benching will be done as necessary to allow access for quarry equipment for stripping, drilling and blasting of overburden and gypsum. Additional benching will be done when necessary to minimize safety hazards associated with falling rock from highwalls.

Mine Phases have been added to Exhibit C, beginning with the ***Current Mining Area*** *in Area B. Gypsum in this area is estimated to be depleted sometime between 2025 and 2026.*

Mining will then progress to Area D. Five Phases (I, II, III, IV, V) have been identified on Exhibit C. Each phase will be active for 1-4 years depending on demand and the availability of gypsum. We have found the gypsum lenses in this area to be irregularly shaped and hard to locate definitively, hence the wide range in years. Therefore, we would expect Area D to be depleted in 5 to 20 years (2030-2045).

Phases VI, VII and VIII are located in Area C. Each phase in this area will be active for 1-4 years depending on demand and the availability of gypsum. Therefore, we would expect Area C to be depleted in 3 to 12 years after Area D is depleted (2033-2057)

7. The existing ranch road which passes by the current quarry operation will continue to be used as the access and haul road, with short spur roads built to reach other gypsum deposits as necessary. The spur roads will be reclaimed when no longer needed for mining: the ranch road will remain.

The Ranch Road that transects the permit is approximately 5,900 feet long and has been improved to approximately 25 feet wide for the use of the landowner after mining operations have been completed.

A 1,650 ft. portion of the Ranch Road that connects Area A to Areas C and D will be widened to 50 ft. to accommodate off-highway equipment. This widened section, plus a small Spur Section, accounts for approximately 2.15 acres of additional disturbance and is included in the total affected area of 70.7 acres.
If the landowner would like portions of the Ranch Road and Spur Roads to remain, an agreement with the landowner will be obtained. A copy of the agreement with the landowner will be provided to the Division prior to requesting a release of the land associated with the portions of road to remain.
Otherwise, reclamation of the additional width of the road and the Spur Section is included in the reclamation calculation.

8. No toxic or acid-forming materials will be exposed during extracting operations. All waste rock, including overburden, will be stored away from surface drainage ways and stabilized to minimize erosion and off-site wind or water deposition.
9. No chemicals will be used on site except for normal petroleum, oils and lubricants for vehicles and equipment, water and dust suppressants for dust control.
10. Dust suppressants (including but not limited to magnesium chloride brine, lignin sulfate and other accepted agents) and water will be used for dust control as needed. Water will be imported to the site via water truck.
11. A portable chemical toilet and other sanitary and safety equipment and facilities will be located on site and moved as needed to support the operation. Pumping and maintenance will be contracted out: human waste and ordinary solid waste will be disposed of off-site. No other structures, including ditches, buildings, or impoundments except those required for storm water control and protection of danger and reclaim areas are anticipated to be placed.

12. Total disturbed land not backfilled, graded, contoured and reseeded will not exceed ~~***9.9***~~ ***15*** acres, including non-permanent haul roads, stockpiles, and plant sites.

Exhibit T, Paragraph 3. of the 112 Permit Conversion, includes a provision that "there may be a requirement by the Division for an increase in bonding to provide for any additional areas disturbed before final release of the revegetated area".

Colorado Lien Company accepted that provision at the time of conversion and will provide a reclamation bond that includes adequate coverage for Total disturbed land not backfilled, graded, contoured and reseeded will not exceed ~~***9.9***~~ ***15*** *acres, including non-permanent haul roads, stockpiles, and plant sites, plus any reclaimed lands that have not received final release.*

13. Technical Revision (TR-2) included the addition of 39 drillholes within the permit boundary. Exhibit C has been amended to show the location of those drillholes.

The approximate drilling date, size, depth, location of the drillhole, status of the drillhole and whether or not water was encountered is summarized in the following table.

Hole ID	Approx. Timetable	Hole Diameter (in)	Latitude (decimal degrees)	Longitude (decimal degrees)	Collar Elevation	Depth (ft)	Backfilled	Encounter Water
Hole #1	June 2023	4.0	40.877145	-105.163793	6005	63.0	Yes	No
Hole #2	June 2023	4.0	40.877631	-105.163750	6013	82.0	Yes	No
Hole #3	June 2023	4.0	40.878043	-105.163632	6013	72.0	Yes	No
Hole #4	June 2023	4.0	40.878644	-105.163561	6012	50.0	Yes	No
Hole #5	June 2023	4.0	40.878569	-105.164181	6026	94.5	Yes	No
Hole #6	June 2023	4.0	40.878895	-105.163909	6010	12.0	Yes	No
Hole #7	June 2023	4.0	40.878913	-105.163122	6004	91.0	Yes	No
Hole #8	June 2023	4.0	40.879037	-105.162496	5965	65.0	Yes	No
Hole #9	June 2023	4.0	40.878779	-105.162829	5997	80.0	Yes	No
Hole #10	June 2023	4.0	40.878518	-105.163097	6006	55.0	Yes	No
2023-1	June 2023	4.0	40.881687	-105.164895	6036	52.0	Yes	No
2023-2	June 2023	4.0	40.881847	-105.165787	6057	50.0	Yes	No
2023-3	June 2023	4.0	40.882327	-105.166802	6070	38.0	Yes	No
2023-4	June 2023	4.0	40.882562	-105.166998	6085	50.0	Yes	No
2023-5	June 2023	4.0	40.882972	-105.168044	6102	39.3	Yes	No
2023-6	June 2023	4.0	40.883094	-105.167496	6086	33.5	Yes	No
2023-7	June 2023	4.0	40.883303	-105.166638	6053	66.0	Yes	No
2023-8	June 2023	4.0	40.883511	-105.166151	6031	66.0	Yes	No
2023-9	June 2023	4.0	40.883474	-105.168772	6099	53.0	Yes	No
2023-10	June 2023	4.0	40.883821	-105.168106	6074	31.0	Yes	No
2023-11	June 2023	4.0	40.884006	-105.167359	6041	50.0	Yes	No
2023-12	June 2023	4.0	40.884331	-105.168615	6092	66.0	Yes	No
2023-13	June 2023	4.0	40.884341	-105.168008	6072	52.0	Yes	No
2023-14	June 2023	4.0	40.884464	-105.169950	6161	66.0	Yes	No
2023-15	June 2023	4.0	40.884493	-105.169504	6127	66.0	Yes	No
2023-16	June 2023	4.0	40.883853	-105.169297	6124	53.0	Yes	No
2023-17	June 2023	4.0	40.882104	-105.165743	6042	80.0	Yes	No
2023-18	June 2023	4.0	40.880033	-105.163667	5961	90.0	Yes	No
2023-19	June 2023	4.0	40.880434	-105.165052	6035	95.0	Yes	No
2023-20	June 2023	4.0	40.880791	-105.167964	6031	67.0	Yes	No
2023-21	June 2023	4.0	40.880507	-105.167715	6023	73.0	Yes	No
2023-22	Sept 2023	4.0	40.879890	-105.164746	5960	65.0	Yes	No
2023-23	Sept 2023	4.0	40.879813	-105.163797	5940	85.0	Yes	No
2023-24	Sept 2023	4.0	40.880459	-105.164404	5979	95.0	Yes	No
2023-25	Sept 2023	4.0	40.880194	-105.163552	5954	95.0	Yes	No
2023-26	Sept 2023	4.0	40.881845	-105.164808	6042	60.0	Yes	No
2023-27	Sept 2023	4.0	40.882546	-105.166370	6044	76.0	Yes	No
2023-28	Sept 2023	4.0	40.883220	-105.167073	6070	80.0	Yes	No
2023-29	Sept 2023	4.0	40.883906	-105.167712	6057	40.0	Yes	No

EXHIBIT E - RECLAMATION PLAN ***(TR-3 revisions in Italics)***

MUNROE QUARRY (M-77-002HR)

Larimer County, CO

Safety & Environment Office Rapid City, SD 57709-0440 **(605) 342-7442 FAX 394-6979**

Reclamation will follow the same concept ~~and schedule as~~ followed since 1977. ~~Since that time, a total of five acres of disturbed land has been successfully reclaimed and released of a total of approximately twelve acres mined.~~

Since operations began in 1977, 27.55 acres have been disturbed of the permitted Total Affected Area of 70.7 acres.
Of that 27.55 acres, 4.82 acres have been reclaimed and released. Another 9.45 acres in Mining Area A have also been reclaimed and will be considered for a Surety Release request in 2024.

A revised reclamation sequence is shown as part of the TR-3, Exhibit F submittal. Each reclamation phase will be completed within 2-3 years after mining has been completed in that area.

1. Waste materials, including overburden, will be used as fill prior to contouring, placement of topsoil and seeding. The material will be placed and spread using a scraper or bulldozer. Contouring will be done with a bulldozer and/or grader to develop drainage patterns similar to surrounding land and previously existing conditions.

Exposing and removing gypsum may result in highwalls ranging in height from 35-60 feet, with a maximum height of 70 feet. Reclaimed slopes will be 2H:1V or gentler as noted in Exhibit L – Reclamation Costs of the 112 Permit Conversion.

To determine slope gradients for Exhibit F, the Reclamation Plan Map, an area approximately 120 feet wide (120 ft H : 60 ft V) will extend inward towards mined out areas from the final mining faces created by removing gypsum.
Within that 120 foot wide area, reclaimed slopes will be 2H:1V or gentler.

The remaining areas within the Total Affected Area of 70.7 acres will be contoured and graded with slopes 3H:1V or gentler, or otherwise mimicking the natural terrain in the permit area.

Overburden or topsoil stockpiles may be placed within the Total Affected Area boundary, but outside of areas that are being mined for gypsum if needed. If this is done, the overburden or topsoil will be shaped to mimic natural terrain with no slopes greater than 3H:1V.
Otherwise, overburden will be placed within previously mined areas.

2. Post-reclamation use will be as rangeland, the same use as pre-mining.
3. The top layer, up to four inches in depth, of existing ground surface (the rooting zone material) will be stripped and handled as topsoil. This material will be stockpiled and protected for use in reclamation.
4. Further reclamation will begin once all extraction of gypsum and backfilling is completed in an area of one to two acres. Topsoil (rooting zone material) will be taken from stockpiles or directly from areas being stripped and placed on the contoured backfill. Topsoil will be spread using a bulldozer. As necessary, based on Natural Resource Conservation Service/District guidelines, topsoil will be amended with other soils and/or biosolids to provide a good seedbed for reclamation.

5. Once placed, soil will be ripped by the bulldozer or plowed to loosen the soil in preparation for seeding. As needed, this material will be disced and/or raked and up to 200 pounds of fertilizer (30-60-30, solid) will be applied to each acre, as required.

6. Seed mix information is provided in Exhibits I and J. See mix will be spread by mechanical broadcasting and/or hydroseeding. Planting will be done in spring or fall to maximize available moisture.

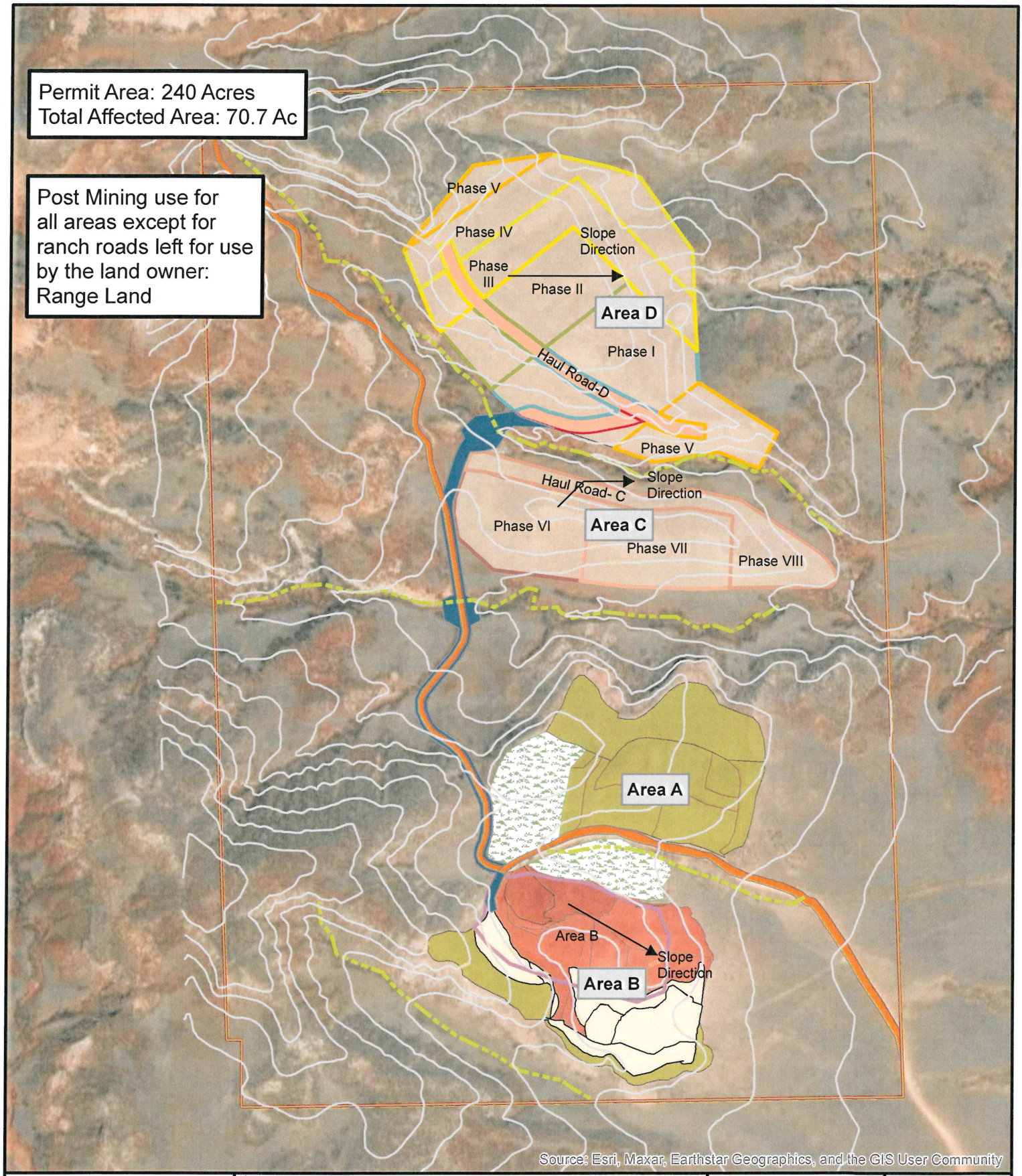
7. As needed, when seed is mechanically broadcast, mulch will be applied at a rate of 3 tons/acre and disk crimped. Mulch will be natural grass hay, straw, or state-approved compost. When seed is hydroseeded, hydro mulching as needed will be done in conjunction with seeding and a tackifier will be used as needed. Newly seeded areas will be fenced as necessary to reduce cattle impact on new plants.

8. Vegetative cover will be reviewed annually to determine if additional seeding, soil amendment or fertilization is needed. The operator will work with the Division of Minerals and Geology, Fort Collins Conservation District and landowner to determine a suitable level of vegetative cover, especially of Mountain Mahogany and other browse.

9. No mining structures will remain after mining. Only the existing ranch road will remain unreclaimed.

10. Total disturbed land not backfilled, graded, contoured and reseeded will not exceed ~~**9.9**~~ **15** acres. Generally, new disturbance will not take place until previously reclaimed land is released, to keep total at or less than ~~**9.9**~~ **15** acres.

11. Technical Revision (TR-2) Reclamation Plan. Thirty-nine (39) holes were drilled exploring for gypsum within the permit boundary. The drill traveled overland. Therefore, no roads or drill pads were constructed that would require reclamation. No water was encountered while drilling the holes. Drillholes were backfilled with drill cuttings and will be monitored for settling within one (1) year of the hole being drilled. If necessary, additional dirt from around the collar of the drill hole will be used to remediate any settling.



Title: Munroe Quarry

Exhibit F- Reclamation Plan Map
Location: NW1/4 & N1/2SW1/4 Sect. 31 T11N R69W
Larimer County, CO
112 Permit Munroe Quarry,
Reclamation Plan Map Revision

Background: World Imagery

Legend

- Post Mine Contours
- PLS
- Drainage
- PLS *240 +/- Acres*
- Current Released Area
- Reclaimed
- Current Disturbed Area
- Permit Boundary
- Revised Affected Area: Final Land Use Wild Life Habitat & Grazing
- Reclamation Phase - Area B
- Reclamation Phase - I
- Reclamation Phase - II
- Reclamation Phase - III
- Reclamation Phase IV
- Reclamation Phase V
- Reclamation Phase VI
- Reclamation Phase VII
- Reclamation Phase VIII
- Reclamation Phase - Haul Road
- Ranch Road
- Spur Road Widening

N W E S

0 250 500 Feet

Last Revised: 3/13/2024
Drawn by: THutchens
Verified by: MG
Surveyed: None

COST SUMMARY WORK

Task description: **TR-3, 15 acres**

Site: **Munroe Gypsum Quarry** Permit Action: 2023TR03 Permit/Job#: M1977002HR

PROJECT IDENTIFICATION

Task #: 000 State: Colorado Abbreviation: None
Date: 1/11/2024 County: Larimer Filename: M002-000
User: JLC

Agency or organization name: DRMS

TASK LIST (DIRECT COSTS)

Task	Description	Form Used	Fleet Size	Task Hours	Cost
001	Highwall blasting	BLASTING	1	49.85	$44,950
002	Reducing highwall	DOZER	2	16.99	$15,766
003	Ripping pit floor	RIPPER	2	10.56	$9,894
004	Rough grading	SITEMAINTENANCE	1	0.00	$937
005	Topsoil application	SCRAPER1	1	13.16	$25,253
006	Reveg backfilled and pit area	REVEGE	1	9.00	$17,656
007	39 holes, 3 ft betonite per hole	BOREHOLE	1	14.00	$1,021
008	Mobilize equipment to site	MOBILIZE	1	8.50	$23,933
	SUBTOTALS:			**122.06**	**$139,410**

INDIRECT COSTS

OVERHEAD AND PROFIT:

Liability insurance:	2.02	Total =	$2,816
Performance bond:	1.05	Total =	$1,464
Job superintendent:	61.03	Total =	$3,972
Profit:	10.00	Total =	$13,941
		TOTAL O & P =	$22,193
		CONTRACT AMOUNT (direct + O & P) =	$161,603

LEGAL - ENGINEERING - PROJECT MANAGEMENT:

Financial warranty processing (legal/related costs):	$500	Total =	$500
Engineering work and/or contract/bid preparation:	4.25	Total =	$6,868
Reclamation management and/or administration:	5.00		$8,080
CONTINGENCY:	0.00	Total =	$0
		TOTAL INDIRECT COST =	$37,641
		TOTAL BOND AMOUNT (direct + indirect) =	**$177,051**

SURFACE BLASTING WORK

Task description: **Highwall blasting**

Site: **Munroe Gypsum Quarry** Permit Action: 2023TR03 Permit/Job#: M1977002HR

PROJECT IDENTIFICATION

Task #: 001 State: Colorado Abbreviation: None
Date: 1/11/2024 County: Larimer Filename: 2023TR03
User: JLC

Agency or organization name: DRMS

BLAST AREA DIMENSIONS

	QUANTITY	UNIT
Blast Area Configuration:	Wedge-shaped mass (highwall reduction using balanced cut/fill)	
Blasting Method Description:	Conventional surface blast (fragmentation only)	
Highwall or Bench Face Angle:	0.50	h:1v
Regraded Slope Angle:	3.00	h:1v
Highwall or Bench Length:	500	feet
Highwall or Bench Width:	88	feet
Highwall or Bench Height:	70.0	feet
Depth to Base of Cut at Highwall:	29.2	feet

BLAST AREA VOLUMES

	QUANTITY	UNIT
Total Volume of Dimensional Mass to be Shot:	19,737	cubic yards
Blast Volume to Subdrill Grade and Blast Pattern Lines:	20,891	cubic yards
Blast Volume to Finish Grade and Blast Pattern Lines:	16,199	cubic yards
Remaining Volume Required to be Re-Shot or Ripped:	3,538	cubic yards

BLAST AREA DESIGN

	QUANTITY	UNIT
Recommended Blasthole Diameter:	4.293	inches
Selected Blasthole Diameter:	7.000	inches
Subdrilling Allowance:	4.5	feet
Blasthole Depth:	21.3	feet
Density of Rock:	Average Density Rock (ANFO Basis)	rock density
Burden to Charge Diameter Ratio:	25	times diameter
Burden:	15.0	feet
Spacing to Burden Ratio:	1.5	times burden
Spacing:	23.0	feet
Cubic Yards of Rock per Blasthole:	248.71	cubic yards
Powder Factor Description:	Medium	rock strength
Powder Factor:	0.575	pounds/cu. yd.
Density of Blasting Agent:	0.85	grams/cc
Quantity of Explosives per Blasthole:	143.01	POUNDS
Height of Powder Column:	10.08	feet
Height of Stemming per Blasthole:	11.25	feet
Stemming to Burden Ratio:	0.75	times burden
Quantity of Stemming per Blasthole:	0.1114	cubic yards
Number of Rows:	4	rows
Number of Blastholes per Row:	21	holes per row
Total Number of Blastholes:	84	holes
Total Length of all Blastholes:	1,792	feet

BLASTING MATERIALS QUANTITIES

	QUANTITY	UNIT
Total Quantity of Stemming Required:	9.35	cubic yards
Total Quantity of Explosives Required:	12,013	pounds
Total Quantity of det. cord/fuse/wire Required:	4,162	linear feet
Quantity of Blasting Caps per Blasthole:	1	cap(s)
Total Quantity of Blasting Caps Required:	84	caps
Quantity of Primers per Blasthole:	0	primer(s)
Total Quantity of Primers Required:	0	primers
Quantity of Delays per Blasthole:	1	delay(s)
Total Quantity of Delays Required:	88	delays

HOURLY EQUIPMENT COST

Shift basis: 1 per day

	Description
Drilling Equipment - Drill:	SCHRAMM T450WS
-Drill Pad Preparation:	Cat D9T - 9SU
Misc. Drill Support Equipment:	NA
Misc. Explosives Support Equipment:	NA
Explosives Delivery –Bulk Truck:	Fuel Tanker, 6x4, 210 HP
-Cap Truck:	NA

Cost Breakdown:	Drilling Equipment	Drill Pad Preparation	Misc. Drill Support	Misc. Expl. Support	Explosives Delivery Bulk Truck	Cap Truck
	Drilling	Dozer			MiscTruck	
%Utilization-machine:	100	20	NA	NA	20	NA
Ownership cost/hour:	$288.33	$238.76	NA	NA	$16.65	NA
Operating cost/hour:	$233.90	$32.46	NA	NA	$7.52	NA
%Utilization-ripper:	NA	10	NA	NA	NA	NA
Ripper own. cost/hour:	NA	$18.32	NA	NA	$0.00	NA
Ripper op. cost/hour:	NA	$0.90	NA	NA	$0.00	NA
Operator cost/hour:	$70.24	$40.04	NA	NA	$70.24	NA
Unit Subtotals:	$592.47	$330.47	$0.00	$0.00	$94.41	$0.00
Number of Units:	1	1	0	0	1	0
Group Subtotals:	$592.47	$330.47	$0.00	$0.00	$94.41	$0.00

Total work team cost/hour: **$1,017.35**

MATERIALS COST

	Description	Unit	Unit Cost	Quantity	Total Cost
Blasting Agent:	Bulk ANFO nom. density (7,900-15,000 fps)	Pound	$0.718	12012.535	$8,625.00
Primers or Boosters:	Cast primer, 0.3 lb (electric or non-electric system)	Each	$2.540	0.000	$0.00
Blasting Caps:	Non-electric cap, inst. (non-electric systems)	Each	$6.400	84.000	$537.60
Det. Cord, fuse, or wire:	NO DET. CORD/FUSE/WIRE REQUIRED	NA	$0.000	4162.400	$0.00
Delays:	MS connectors (non-electric systems)	Each	$8.690	88.000	$764.72
Miscellaneous:	NO MISCELLANEOUS MATERIALS REQUIRED	NA	$0.000	0.000	$0.00
Drill bits:	Bit life = 1,750	Linear feet	$1,825.64	1.024	$1,869.46

Total Materials Cost: **$11,796.78**

DRILLING AND EXPLOSIVES PREPARATION TIME

Total Drilling Length:	1,792	linear feet
Unadjusted Drilling Rate:	82.00	feet/hour
Drilling Time:	34.33	hours

Job Condition Corrections:

Site Altitude:	6,100	feet
Altitude Adjustment:	0.95	(DRMS est.)
Job Efficiency Factor:	0.67	(CH. Exc. HB)
Adjusted Drilling Rate:	**52.19**	feet/hour
Explosives Prep. Time:	15.52	hours

JOB TIME AND COST

Total Job Time: **49.86** Hours

Unit cost: $2.152 per cu. yd. Total Job Cost: **$44,950**

BULLDOZER WORK

Task description: **Reducing highwall**

Site: **Munroe Gypsum Quarry** Permit Action: 2023TR03 Permit/Job#: M1977002HR

PROJECT IDENTIFICATION

Task #: 002 State: Colorado Abbreviation: None
Date: 1/11/2024 County: Larimer Filename: M002-002
User: JLC

Agency or organization name: DRMS

HOURLY EQUIPMENT COST

Basic Machine: Cat D9T - 9SU
Horsepower: 405
Blade Type: Semi-Universal
Attachment: 3-shank ripper
Shift Basis: 1 per day
Data Source: (CRG)

Cost Breakdown:

		Utilization %
Ownership Cost/Hour:	$238.76	NA
Operating Cost/Hour:	$162.29	100
Ripper own. Cost/Hour:	$18.32	NA
Ripper op. Cost/Hour:	$4.49	50
Operator Cost/Hour:	$40.04	NA

Total unit Cost/Hour: $463.90
Total Fleet Cost/Hour: **$927.79**

MATERIAL QUANTITIES

Initial Volume: 27,569
Swell factor: 1.165
Loose volume: **32,118** LCY

Source of estimated volume: Division of Reclamation, Mining & Safety
Source of estimated swell factor: Cat Handbook

HOURLY PRODUCTION

Average push distance: 105 feet
Unadjusted hourly production: 1,205.7 LCY/hr

Materials consistency description: Rock, avg. ripped or blasted 0.7

Average push gradient: -20 %
Average site altitude: 6,000 feet

Material weight: 2,100 lbs/LCY

Weight description: Shale

Job Condition Correction Factor		Source
Operator Skill:	0.900	(AB.AVG.)
Material consistency:	0.700	(CAT HB)
Dozing method:	1.200	(S-BY-S)
Visibility:	1.000	(AVG.)

Job efficiency:	0.830	(1 SHIFT/DAY)
Spoil pile:	0.800	(FND-RF)
Push gradient:	1.426	(CAT HB)
Altitude:	1.000	(CAT HB)
Material Weight:	1.095	(CAT HB)
Blade type:	1.000	(PAT)

Net correction: 0.7838

Adjusted unit production: 945.03 LCY/hr
Adjusted fleet production: **1890.06** LCY/hr

JOB TIME AND COST

Fleet size: 2 Dozer(s)
Unit cost: $0.491/LCY

Total job time: **16.99** Hours
Total job cost: **$15,766**

BULLDOZER RIPPING WORK

Task description: **Ripping pit floor**

Site: **Munroe Gypsum Quarry** Permit Action: 2023TR03 Permit/Job#: M1977002HR

PROJECT IDENTIFICATION

Task #: 003 State: Colorado Abbreviation: None
Date: 1/11/2024 County: Larimer Filename: M002-003
User: JLC

Agency or organization name: DRMS

HOURLY EQUIPMENT COST

Basic Machine: Cat D9T - 9SU Horsepower: 405
Ripper Attachment: 3-Shank Ripper Shift Basis: 1 per day
Data Source: (CRG)

Cost Breakdown:

		Utilization %
Ownership Cost/Hour:	$238.76	NA
Operating Cost/Hour:	$162.29	100
Ripper Ownership Cost/Hour:	$18.32	NA
Ripper Operating Cost/Hour:	$8.98	100
Operator Cost/Hour:	$40.04	NA
Total Unit Cost/Hour:	$468.39	

Total Fleet Cost/Hour: **$936.77**

MATERIAL QUANTITIES

Selected estimating method: Area

Alternate Methods:

Seismic: NA Bank Volume: NA BCY NA
Area: 15.00 acres Rip Depth (ft): 1.00 Volume: 24,200 BCY or CCY

Source of estimated quantity: Depth calculated based on values provided in cost estimation

HOURLY PRODUCTION

Seismic:

Seismic Velocity: NA feet/second

Area:

Average Ripping Depth:	2.63	feet/pass
Average Ripping Width:	7.67	feet/pass
Average Ripping Length:	254.00	feet/pass
Average Dozer Speed:	88.00	feet/minute
Average Maneuver Time:	0.25	minutes/pass
Production per unit area:	0.856	acres/hour

Job Condition Correction Factors

Unadjusted Hourly Unit Production: 0.856 Acres/hr

Site Altitude:	6,000	feet
Altitude Adj:	1.00	(CAT HB)
Job Efficiency:	0.83	(1 shift/day)
Net Correction:	0.83	multiplier

Adjusted Hourly Unit Production: 0.71 Acres/hr
Adjusted Hourly Fleet Production: **1.42** Acres/hr

JOB TIME AND COST

Fleet size: 2 Grader(s) Total job time: **10.56** Hours

Unit cost: $659.574 Per acre Total job cost: **$9,894**

SITE MAINTENANCE

Task description: **Rough grading**

Site: **Munroe Gypsum Quarry** Permit Action: 2023TR03 Permit/Job#: M1977002HR

PROJECT IDENTIFICATION

Task #: 004 State: Colorado Abbreviation: None
Date: 1/12/2024 County: Larimer Filename: M002-004
User: JLC

Agency or organization name: DRMS

UNIT COSTS

Maintenance Item	Hours per Year	Menu Selection	Quantity	Unit	Unit Cost	Total Cost
Grading	7.00	Cat D9T - 9SU	2.00	EA	$468.39	$936.78

Job Hours: **0.00** **Total Cost:** **$936.78**

SCRAPER TEAM WORK

Task description: **Topsoil application**

Site: **Munroe Gypsum Quarry** Permit Action: 2023TR03 Permit/Job#: M1977002HR

PROJECT IDENTIFICATION

Task #: 005 State: Colorado Abbreviation: None
Date: 1/12/2024 County: Larimer Filename: M002-005
User: JLC

Agency or organization name: DRMS

HOURLY EQUIPMENT

COSTShift basis: 1 per day

	Equipment Description
-Scraper:	Cat 637G w/push-pull
-Dozer:	Cat D9T - 9SU
Support Equipment -Load Area:	NA
-Dump Area:	NA
Road Maintenance –Motor Grader:	CAT 14M
-Water Truck:	Water Tanker, 7,000 Gal.

Cost Breakdown:

	Scraper Work Team		Support Equipment		Maintenance Equipment	
	Scraper	Dozer	Load Area	Dump Area	Motor Grader	Water Truck
%Utilization-machine:	100	55	NA	NA	30	25
Ownership cost/hour:	$255.23	$238.76	NA	NA	$149.33	$86.29
Operating cost/hour:	$280.59	$89.26	NA	NA	$27.84	$28.44
%Utilization-ripper:	NA	0	NA	NA	NA	NA
Ripper own. cost/hour:	NA	$18.32	NA	NA	$0.00	$0.00
Ripper op. cost/hour:	NA	$0.00	NA	NA	$0.00	$0.00
Operator cost/hour:	$47.07	$40.04	NA	NA	$46.87	$28.23
Unit Subtotals:	$582.89	$386.37	NA	NA	$224.04	$142.96
Number of Units:	2	1	0	0	1	1
Group Subtotals:	Work:	$1,552.15	Support:	$0.00	Maint:	$367.00

Total work team cost/hour: **$1,919.15**

MATERIAL QUANTITIES

Initial volume: 10,358 CCY Swell factor: 1.215
Loose volume: **12,585** LCY

Source of estimated volume: Division of Reclamation, Mining & Safety
Source of estimated swell factor: Cat Handbook

HOURLY PRODUCTION

Material weight: 1,600 lbs/LCY
Material description: Top Soil
Rated Payload: 81,600 pounds
Payload Capacity: 51.00 LCY

Scraper Bowl (volume) Basis:

Struck Volume: 24.00 LCY
Heaped Volume: 34.00 LCY
Average Volume: 29.00 LCY
Adjusted Capacity: **29.00** LCY

Cycle Time:

Scraper Loading Time: 1.00 Minutes
Maneuver and Spread Time: 0.60 Minutes

Job Condition Correction: Site Altitude: 6000 feet

	Scraper	Push Dozer	Source
Altitude Adj:	1.000	1.000	(CAT HB)
Job Efficiency:	0.830	0.830	(CAT HB)
Net Correction:	0.830	0.830	

Travel Time:

Road Condition: Hard, smooth, stabilized, surfaced, watered, maintained 2.0

Haul Route:

Seg #	Haul Distance (Ft)	Grade (%)	Roll. Res (%)	Total Res (%)	Velocity (fpm)	Travel Time (min)
1	210.00	15.00	2.00	17.00	542	0.39
2	790.00	0.00	2.00	2.00	2939	0.44

Haul Time: **0.83** minutes

Return Route:

Seg #	Haul Distance (Ft)	Grade (%)	Roll. Res (%)	Total Res (%)	Velocity (fpm)	Travel Time (min)
1	790.00	0.00	2.00	2.00	2960	0.40
2	210.00	-15.00	2.00	-13.00	1628	0.19

Return Time: **0.59** minutes

Total Scraper team cycle time: **3.02** minutes
Adjusted for job conditions: 956.42 LCY/Hour
Selected Number of Scrapers: 2 Scraper(s)
Adjusted single scraper team (unit) hourly production: 956.42 LCY/Hour
Adjusted multiple scraper team (fleet) hourly production: **956.42** LCY/Hour

Unadjusted unit production/hour: 1,152.32 LCY/Hour
Optimal Number of Scrapers per push dozer: _____

JOB TIME AND COST

Fleet size: 1 Team(s) Total job time: **13.16** Hours

Unit cost: $2.007 /LCY Total job cost: **$25,253**

REVEGETATION WORK

Task description: **Reveg backfilled and pit area**

Site: **Munroe Gypsum Quarry** Permit Action: 2023TR03 Permit/Job#: M1977002HR

PROJECT IDENTIFICATION

Task #: 006 State: Colorado Abbreviation: None
Date: 1/12/2024 County: Larimer Filename: M002-006
User: JLC

Agency or organization name: DRMS

FERTILIZING

Materials

Description	Units / Acre	Unit	Cost / Unit	Cost /Acre
			$	$
			Total Fertilizer Materials Cost/Acre	**$0.00**

Application

Description	Cost /Acre
	$
Total Fertilizer Application Cost/Acre	**$0.00**

TILLING

Description	Cost /Acre
Disc harrowing, 6" deep (MEANS 32 91 13.23 6100)	$112.82
Total Tilling Cost/Acre	**$112.82**

SEEDING

Seed Mix	Rate – PLS LBS / Acre	Seeds per SQ. FT	Cost /Acre
Blue Grama - Hachita	0.25	4.08	$3.99
Indian Ricegrass - Native	1.60	5.18	$10.40
Little Bluestem - Native	0.88	5.22	$11.87
Oats - Ajay	4.50	1.34	$1.49
Mahogany, Mountain	0.25	0.34	$9.20
Western Wheatgrass - Arriba	2.00	5.05	$13.00
Totals Seed Mix	9.48	21.21	**$49.95**

Application

Description	Cost /Acre
Broadcast seeding [DMG]	$267.22
Total Seed Application Cost/Acre	**$267.22**

MULCHING and MISCELLANEOUS

Materials

Description	Units / Acre	Unit	Cost / Unit	Cost /Acre
Hay, delivered {MEANS 31 25 14.16 1200}	1.00	TON	$429.79	$429.79
Total Mulch Materials Cost/Acre				**$429.79**

Application

Description	Cost /Acre
Crimping, with tractor {DMG survey data}	$74.46
Power mulcher (MEANS 32 91 13.16 0350)	$147.67
Total Mulch Application Cost/Acre	**$222.13**

NURSERY STOCK PLANTING

Common Name	No / Acre	Type and Size	Planting Cost	Fertilizer Pellet Cost	Cost /Acre
					$
Totals Nursery Stock Cost / Acre					**$0.00**

JOB TIME AND COST

No. of Acres: 15
Estimated Failure Rate: 30%
*Selected Replanting Work Items: SEEDING

Cost /Acre: $1,081.91
Cost /Acre*: $317.17

Initial Job Cost: **$16,228.65**
Reseeding Job Cost: **$1,427.27**
Total Job Cost: **$17,656**
Job Hours: **9.00**

BOREHOLE SEALING WORK

Task description: **39 holes, 3 ft betonite per hole**

Site: **Munroe Gypsum Quarry** Permit Action: 2023TR03 Permit/Job#: M1977002HR

PROJECT IDENTIFICATION

Task #: 007 State: Colorado Abbreviation: None
Date: 1/12/2024 County: Larimer Filename: M002-007
User: JLC

Agency or organization name: DRMS

UNIT COSTS

Borehole Description	Sealing/Item Method	Diameter	Length	Quantity	Unit	Unit Cost	Total Cost
Fill 117 LF with betonite	Bentonite seal - 4 in. (labor, equip, materials)	4	117	117.00	LF	$6.11	$714.99
Backfill with cuttings	General laborer - Colorado (total incl. fringes, empl. burden)	NA	NA	13.00	HR	$23.53	$305.89

Job Hours: **14.00** **Total Cost**: **$1,021.00**

EQUIPMENT MOBILIZATION/DEMOBILIZATION

Task description: **Mobilize equipment to site**

Site: **Munroe Gypsum Quarry** Permit Action: 2023TR03 Permit/Job#: M1977002HR

PROJECT IDENTIFICATION

Task #: 008 State: Colorado Abbreviation: None
Date: 1/12/2024 County: Larimer Filename: M002-008
User: JLC

Agency or organization name: DRMS

EQUIPMENT TRANSPORT RIG COST

Shift basis: 1 per day
Cost Data Source: CRG Data

Truck Tractor Description: GENERIC ON-HIGHWAY TRUCK TRACTOR, 6X4, DIESEL POWERED, 400 HP (2ND HALF, 2006)

Truck Trailer Description: GENERIC FOLDING GOOSENECK, DROP DECK EQUIPMENT TRAILER (25T, 50T, AND 100T)

Cost Breakdown:

Available Rig Capacities	0-25 Tons	26-50 Tons	51+ Tons
Ownership Cost/Hour:	$20.26	$36.04	$47.05
Operating Cost/Hour:	$39.51	$76.08	$82.85
Operator Cost/Hour:	$22.52	$22.52	$22.52
Helper Cost/Hour:	$0.00	$23.53	$23.53
Total Unit Cost/Hour:	$82.29	$158.17	$175.95

NON ROADABLE EQUIPMENT:

Machine Description	Weight/ Unit (TONS)	Owner ship Cost/hr/ unit	Haul Rig Cost/hr/unit	Fleet Size	Haul Trip Cost/hr/ fleet	Return Trip Cost/hr/ fleet	DOT Permit Cost/ fleet
Cat D9T - 9SU	66.13	$257.08	$175.95	2	$866.06	$351.90	$250.00
Cat 637G w/push-pull	59.59	$255.23	$175.95	2	$862.36	$351.90	$250.00
CAT 14M	23.57	$149.33	$82.29	1	$231.62	$82.29	$250.00
Drill/Broadcast Seeder with Tractor	25.00	$6.73	$82.29	2	$178.04	$164.58	$250.00
Power Mulcher (Bowie LD-90)	6.00	$25.94	$82.29	1	$108.23	$82.29	$250.00
SCHRAMM T450WS	0.00	$288.33	$82.29	1	$370.62	$82.29	$250.00
Subtotals:					**$2,616.93**	**$1,115.25**	**$1,500.00**

ROADABLE EQUIPMENT:

Machine Description	Total Cost/hr/ unit	Fleet Size	Haul Trip Cost/hr/ fleet	Return Trip Cost/hr/ fleet
Light Duty Pickup, 4x4, 1 T. Crew	$27.44	1	$27.44	$27.44
Fuel Tanker, 6x4, 210 HP	$93.16	2	$186.32	$186.32
Water Tanker, 7,000 Gal.	$238.97	1	$238.97	$238.97

Subtotals:	**$452.73**	**$452.73**

EQUIPMENT HAUL DISTANCE and Time

Nearest Major City or Town within project area region:	FORT COLLINS	
Total one-way travel distance:	25.00	miles
Average Travel Speed:	40.00	mph

Total Non-Roadable Mob/Demob Cost * '* two round trips with haul rig:	$23,366.81
Total Roadable Mob/Demob Cost ** ** one round trip, no haul rig:	$565.91

Transportation Cycle Time:

	Non-Roadable Equipment	Roadable Equipment
Haul Time (Hours):	0.63	0.63
Return Time (Hours):	0.63	0.63
Loading Time (Hours):	1.50	NA
Unloading Time (Hours):	1.50	NA
Subtotals:	4.25	1.25

JOB TIME AND COST

Total job time:	**8.50**	Hours
Total job cost:	**$23,933**	