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November 4, 2013

Bob Oswald
Colorado Division of Reclamation, Mining, and Safety
691 CR 233, Suite A-2
Durango, CO 81301

Revenue Mine: TR-01 Submittal

Mr. Oswald,

This letter and associated attachments is in response to the Silver Star Resources Revenue Mine Technical Revision-01 Adequacy Review Letter dated October 31, 2013.

The adequacy response has resulted in changes to the following items:
-Appendices 6 and 12
-Exhibit L
-Map G-13

1. Please describe the joints or method of joining the sections of half-culverts to be used for the conveying stormwater flows.

The jointing is described in Appendix 6, page 1.

2. Please describe the materials used for the half-culverts, i.e., flexible or rigid, galvanized or plastic, length of sections to be joined.

The half-culverts will be corrugated metal pipe in 20-foot sections. See Appendix 6, page 1 for additional details.

3. How will they be removed and disposed of at the time of reclamation?

The culverts will be removed using large equipment and disposed of off-site. See Appendix 6, page 1 for additional details.

4. There are several steep sections shown in the overall design plans for the half-culverts. Please acknowledge that if certain portions of the half-culverts fail, the operator must perform the required remedial actions as soon as practicable, which may include simply repairing them or possibly installing a different type of engineered conveyance structure.

This statement is located in Appendix 6, page 1.

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5. Water discharge pipes no. 1 and 2 (aka the "weep lines") described in Appendix 12 will be buried in the old waste rock, in a location that extends along the toe of the natural slope south of the former location of the old mine water pond. The map shows them to be in close proximity to each other. Please state whether there will be any horizontal or vertical distance between them, and/or whether they will be buried in the same trench.

The weep lines will be spaced 2 feet apart in the same trench. See Map G-13 for a design drawing of the weep line trench cross-section.

6. Appendix 12 describes the one-quarter inch-minus rock that is to be delivered to the leach field and applied on top of the membrane liner. The narrative states that the rock will be delivered to the liner but not dropped directly on it so as not to breach it, and that a small piece of equipment will be down in the lined basin to spread the rock. The rock is to be delivered therefore to the floor of the liner. Since the horizontal length of the 2H:IV slope is longer than the reach of the largest excavator, please describe what will be used to perform this task.

The rock and liner will be placed into the leach field in sections. Appendix 12, subsection i further details the construction process.

7. Appendix 12 describes the French drain, between the Atlas Creek and the Mine Pond. Please provide the depth or elevation at which the French drain will be placed. If appropriate, frame the response in terms of elevations of the upper and lower ends, and include the slope.

Additional details regarding the french drain are described in Subsection iii of Appendix 12. A cross-section of the french drain is also shown on Map G-12.

8. Do either of the ends of the French drain daylight?

Only the end of the french drain daylights, which is into Sneffels Creek.

9. The text on page 14 discusses "mine water pond hydrology" and appears to be repeated from page 13. Is there a portion of the French drain text missing? If so, please provide it.

The error has been corrected in Appendix 12.

10. The text on page 16 of Appendix 12, specifically paragraph 3, states that the "pond is not permanent, it will only be in place over the life of the mine." Other text (and Map F - Reclamation Plan) reflect that the pond will be permanent. Please clarify this, and provide different slope gradient and factor of safety, if necessary.

The mine water pond is to be permanent and has 3H:1V outslopes. The engineering statement in Appendix 12 has been corrected to reflect this.

11. The reclamation costs included in revised Exhibit L appear to include the necessary tasks, although some of them seem a bit light (specifically building demolition and seeding). No further estimates from you are needed, but the Division will send you and the operator the updated figures, after the responses to this letter are received by the Division.

Exhibit L has been updated to include cost estimates for half-culvert removal.

As requested in your phone conversation on November, 4, 2013, Exhibit L has been updated to mention removal of mill chemicals.

Please contact if additional changes are needed.

Sincerely,

Greg Lewicki

Greg Lewicki, PE
Greg Lewicki and Associates

CC: John Trujillo, SMO
Rory Williams, SMO

APPENDIX 6 – STORMWATER CALCULATIONS AND DESIGNS

Half-Culvert Collection and Diversion Ditches

The general cross-sections and designs for the half-culvert collection and diversion ditches are shown on Map G-7. The sections of half-culverts will be joined using standard practices of joining culvert sections. Belt conveyor material will be used for transition between culvert sections in 6-foot pieces. The belt will be bolted to the culvert sections. The pipes will be joined using coupling bands and band fastening devices such as connecting bolts, rods, lugs, or angles. The coupling bands will be installed to provide straight alignment of the connecting pipe ends. The bands will be positioned to overlap adjacent pipe ends equally. The coupling bands will be corrugated to match the corrugations of the pipe section ends being connected. The joining may require flat or o-ring gasket if deemed necessary by site conditions. The half-culverts will be in lengths of 20 feet. For examples, Segment 1 of Collection Ditch #2 is approximately 150 feet long and will have approximately seven 20-foot culvert sections and one 10-foot culvert section.

At the time of reclamation, half-culvert removal will be similar to the installation process. Large equipment such as CAT 960 loader with a chain secured to the bucket will remove the half-culverts. The type of equipment will depend on the site conditions, but will have to be appropriate and available for use. The half-culvert waste materials will be properly disposed at an off-site location such as in a landfill. The reclamation costs for the half-culvert removal are included in Exhibit L.

The mine personnel will monitor and maintain all stormwater control structures during the life of the mine and throughout reclamation until final bond release. Such maintenance activities may include:

- Regular cleaning out and inspection of all stormwater control structures
- Replacement or repair of damaged sections of ditches as needed and as soon as practical, which may include simply repairing them or possibly installing a different type of engineered conveyance structure
- Inspections to ensure integrity of stormwater sediment ponds
- Change designs and/or engineering of the stormwater control structures if necessary

SWB-1

```
Graphical Peak Discharge
Project: SWB-1                          By: B Langenfeld   Date: 05/23/12
Location: Revenue                       Checked:           Date:
Developed
1. Data:
   Drainage area:.....................A = 17.9530Acres
   Runoff Curve Number:.............CN = 70
   Time of Concentration:...........Tc = 0.25
   Storm Type:.......................  = II
   Pond and swamp areas spread
   throughout watershed.............. = 0.00 percent of A
                                        0.0000 Acres
2. Frequency.......................yr = 100
3. Rainfall,P(24-hour).............in = 3.30
4. Initial abstraction, Ia.......... = 0.8571
5. Compute Ia/P..................... = 0.2597
6. Unit peak discharge, qu......csm/in = 655.74
7. Runoff,Q........................in = 0.8869
8. Pond & swap adjustment factor,...Fp = 1.00
9. Peak Discharge,qp..............cfs = 16.3142
```

SWB-2

```
Graphical Peak Discharge
Project: SWB-2                          By: B Langenfeld   Date: 05/23/12
Location: Revenue                       Checked:           Date:
Developed
1. Data:
   Drainage area:.....................A = 1.8430Acres
   Runoff Curve Number:.............CN = 74
   Time of Concentration:...........Tc = 0.03
   Storm Type:.......................  = II
   Pond and swamp areas spread
   throughout watershed.............. = 0.00 percent of A
                                        0.0000 Acres
2. Frequency.......................yr = 100
3. Rainfall,P(24-hour).............in = 2.20
4. Initial abstraction, Ia.......... = 0.7027
5. Compute Ia/P..................... = 0.3194
6. Unit peak discharge, qu......csm/in = 930.59
7. Runoff,Q........................in = 0.4474
8. Pond & swap adjustment factor,...Fp = 1.00
9. Peak Discharge,qp..............cfs = 1.1990
```

SWB-3

Graphical Peak Discharge
Project: SWB-3 By: B Langenfeld Date: 05/23/12
Location: Revenue Checked: Date:
Developed

1. Data:
   Drainage area:.....A = 32.2460Acres
   Runoff Curve Number:.....CN = 75
   Time of Concentration:.....Tc = 0.24
   Storm Type:..... = II
   Pond and swamp areas spread
   throughout watershed..... = 0.00 percent of A
   0.0000 Acres
2. Frequency.....yr = 100
3. Rainfall,P(24-hour).....in = 3.30
4. Initial abstraction, Ia..... = 0.6667
5. Compute Ia/P..... = 0.2020
6. Unit peak discharge, qu.....csm/in = 696.38
7. Runoff,Q.....in = 1.1622
8. Pond & swap adjustment factor,...Fp = 1.00
9. Peak Discharge,qp.....cfs = 40.7778

SWB-4

Graphical Peak Discharge
Project: SWB-4 By: B Langenfeld Date: 05/23/12
Location: Revenue Checked: Date:
Developed

1. Data:
   Drainage area:.....A = 14.0470Acres
   Runoff Curve Number:.....CN = 73
   Time of Concentration:.....Tc = 0.21
   Storm Type:..... = II
   Pond and swamp areas spread
   throughout watershed..... = 0.00 percent of A
   0.0000 Acres
2. Frequency.....yr = 100
3. Rainfall,P(24-hour).....in = 3.30
4. Initial abstraction, Ia..... = 0.7397
5. Compute Ia/P..... = 0.2242
6. Unit peak discharge, qu.....csm/in = 723.84
7. Runoff,Q.....in = 1.0473
8. Pond & swap adjustment factor,...Fp = 1.00
9. Peak Discharge,qp.....cfs = 16.6388

SWB-5

Graphical Peak Discharge
Project: SWB-5 By: B Langenfeld Date: 05/23/12
Location: Revenue Checked: Date:
Developed

1. Data:
   Drainage area:.....A = 4.4050Acres
   Runoff Curve Number:.....CN = 73
   Time of Concentration:.....Tc = 0.29
   Storm Type:..... = II
   Pond and swamp areas spread
   throughout watershed..... = 0.00 percent of A
   0.0000 Acres
2. Frequency.....yr = 100
3. Rainfall,P(24-hour).....in = 3.30
4. Initial abstraction, Ia..... = 0.7397
5. Compute Ia/P..... = 0.2242
6. Unit peak discharge, qu.....csm/in = 630.71
7. Runoff,Q.....in = 1.0473
8. Pond & swap adjustment factor,...Fp = 1.00
9. Peak Discharge,qp.....cfs = 4.5464

SWB-6

10-Yr 24-hr Event
Runoff Curve Number and Runoff
Project: SWB-6 By: B Langenfeld Date: 05/23/12
Location: Revenue Checked: Date:
Developed

1. Runoff Curve Number (CN)

Cover description	CN	Soil Group	Area(Acre)
Mined Land, Disturbed (Poor)	87	C	8.131

CN (weighted): 87.0
Total Area: 8.131 Acre

2. Runoff

Return Period:	10-Year	
Rainfall, P:	2.20	in
Runoff, Q:	1.0645	in
Runoff Volume:	0.7213	Acre-Ft

25-Yr 24-hr Event
Runoff Curve Number and Runoff
Project: SWB-6 By: B Langenfeld Date: 05/23/12
Location: Revenue Checked: Date:
Developed

1. Runoff Curve Number (CN)

Cover description	CN	Soil Group	Area(Acre)
Mined Land, Disturbed (Poor)	87	C	8.131

CN (weighted): 87.0
Total Area: 8.131 Acre

2. Runoff

Return Period:	25-Year	
Rainfall, P:	2.60	in
Runoff, Q:	1.3952	in
Runoff Volume:	0.9454	Acre-Ft

10-Yr 24-hr Event
Graphical Peak Discharge
Project: SWB 6 By: B Langenfeld Date: 03/23/12
Location: Revenue Mine Checked: Date:
Developed

1. Data:
   Drainage area:.....A = 6.9550Acres
   Runoff Curve Number:.....CN = 87
   Time of Concentration:.....Tc = 0.35
   Storm Type:..... = II
   Pond and swamp areas spread
   throughout watershed..... = 0.00 percent of A
   0.0000 Acres
2. Frequency.....yr = 10
3. Rainfall,P(24-hour).....in = 2.60
4. Initial abstraction, Ia..... = 0.2989
5. Compute Ia/P..... = 0.1149

SWB-7

10-Yr 24-hr Event
Runoff Curve Number and Runoff
Project: SWB-7 By: B Langenfeld Date: 05/23/12
Location: Revenue Mine Checked: Date:
Developed

1. Runoff Curve Number (CN)

Cover description	CN	Soil Group	Area(Acre)
Mined Land, Disturbed (Poor)	87	C	14.431

CN (weighted): 87.0
Total Area: 14.431 Acre

2. Runoff

Return Period:	10-Year	
Rainfall, P:	2.20	in
Runoff, Q:	1.0645	in
Runoff Volume:	1.2801	Acre-Ft

25-Yr 24-hr Event
Runoff Curve Number and Runoff
Project: SWB-7 By: B Langenfeld Date: 04/05/12
Location: Revenue Mine Checked: Date:
Developed

1. Runoff Curve Number (CN)

Cover description	CN	Soil Group	Area(Acre)
Mined Land, Disturbed (Poor)	87	C	14.431

CN (weighted): 87.0
Total Area: 14.431 Acre

2. Runoff

Return Period:	25-Year	
Rainfall, P:	2.60	in
Runoff, Q:	1.3952	in
Runoff Volume:	1.6778	Acre-Ft

10-Yr 24-hr Event
Graphical Peak Discharge
Project: SWB-7 By: B Langenfeld Date: 05/23/12
Location: Revenue Mine Checked: Date:
Developed

1. Data:
   Drainage area:.....A = 14.4310Acres
   Runoff Curve Number:.....CN = 87
   Time of Concentration:.....Tc = 0.04
   Storm Type:..... = II
   Pond and swamp areas spread
   throughout watershed..... = 0.00 percent of A
   0.0000 Acres
2. Frequency.....yr = 10
3. Rainfall,P(24-hour).....in = 2.20
4. Initial abstraction, Ia..... = 0.2989
5. Compute Ia/P..... = 0.1358
6. Unit peak discharge, qu.....csm/in = 991.04
7. Runoff,Q.....in = 1.0645
8. Pond & swap adjustment factor,...Fp = 1.00
9. Peak Discharge,qp.....cfs = 23.7875

SWB-8

10-Yr 24-hr Event
Runoff Curve Number and Runoff
Project: SWB-8 By: B Langenfeld Date: 05/23/12
Location: Revenue Mine Checked: Date:
Developed

1. Runoff Curve Number (CN)

Cover description	CN	Soil Group	Area(Acre)
Mined Land, Disturbed (Poor)	87	C	1.563

CN (weighted): 87.0
Total Area: 1.563 Acre

2. Runoff

Return Period:	10-Year	
Rainfall, P:	2.20	in
Runoff, Q:	1.0645	in
Runoff Volume:	0.1386	Acre-Ft

25-Yr 24-hr Event
Runoff Curve Number and Runoff

Project: SWB-8 By: B Langenfeld Date: 05/23/12
Location: Revenue Mine Checked: Date:
Developed

1. Runoff Curve Number (CN)

Cover description	CN	Soil Group	Area(Acre)
Mined Land, Disturbed (Poor)	87	C	1.563

CN (weighted): 87.0
Total Area: 1.563 Acre

2. Runoff

Return Period:	25-Year	
Rainfall, P:	2.60	in
Runoff, Q:	1.3952	in
Runoff Volume:	0.1817	Acre-Ft

Diversion Ditch #1

Channel Design (Non-Erodible)
Channel Type: Triangular, Unequal Side Slopes
Dimensions: Left Side Slope 1.00:1
Right Side Slope 1.00:1

Wetted Perimeter: 5.57
Area of Wetted Cross Section: 3.88

Channel Slope: 3.7000
Manning's n of Channel: 0.0400

Discharge: 21.76 cfs
Depth of Flow: 1.97 feet
Velocity: 5.61 fps

Channel Lining: Rock
Freeboard: 0.30 feet

Diversion Ditch #2

Channel Design (Non-Erodible)
Channel Type: Triangular, Equal Side Slopes
Dimensions: Left Side Slope 1.00:1
Right Side Slope 1.00:1

Wetted Perimeter: 0.00
Area of Wetted Cross Section: 0.00

Channel Slope: 1.1000
Manning's n of Channel: 0.0400

Discharge: 42.00 cfs
Depth of Flow: 3.16 feet
Velocity: 0.00 fps

Channel Lining: Rock
Freeboard: 0.30 feet

Diversion Ditch #3

```
Channel Design (Non-Erodible)
Channel Type:  Trapezoidal, Equal Side Slopes
Dimensions:  Left Side Slope 1.50:1
             Right Side Slope 1.50:1
             Base Dimension:  2.00

Wetted Perimeter:  6.04
Area of Wetted Cross Section:  4.12

Channel Slope: 2.0000
Manning's n of Channel: 0.0305

Discharge:  22.00 cfs
Depth of Flow:  1.12 feet
Velocity:  5.34 fps

Channel Lining:  Excavated, No Vegetation
Freeboard:  0.30 feet
```

Collection Ditch #1

```
Channel Design
Project: Collection #1                  By: B Langenfeld   Date: 03/23/12
Location: Revenue Mine                  Checked:           Date:
Channel Type:  Triangular, Equal Side Slopes
1. Channel Geometric Properties
  Dimensions :  Left Side Slope..................................... = 1.50:1
                Right Side Slope.................................... = 1.50:1
2. Design Parameters
  Mannings coefficient,n.............................................. :  0.035
  Bed Slope,s (%)..................................................... :  3.000
3. Design details
  Discharge........................................................... :  10.00 cfs
  Depth of Flow....................................................... :  1.10 feet
  Velocity............................................................ :  5.50 fps
  Channel Lining...................................... :  Cobbles and shingles
  Freeboard........................................................... :  0.30 feet
```

Collection Ditch #2

Same as Collection Ditch #1

Collection Ditch #3

```
Channel Design
Project: Collection #3                    By: B Langenfeld    Date: 03/23/12
Location: Revenue Mine                    Checked:            Date:
Channel Type:  Triangular, Equal Side Slopes
1. Channel Geometric Properties
  Dimensions :  Left Side Slope..................................... = 1.50:1
                Right Side Slope.................................... = 1.50:1
2. Design Parameters
  Mannings coefficient,n.............................................. :  0.035
  Bed Slope,s (%)..................................................... :  2.900
3. Design details
  Discharge........................................................... :  26.00 cfs
  Depth of Flow....................................................... :  1.78 feet
  Velocity............................................................ :  5.50 fps
  Channel Lining...................................... :  Cobbles and shingles
  Freeboard........................................................... :  0.30 feet
```

Collection Ditch #4

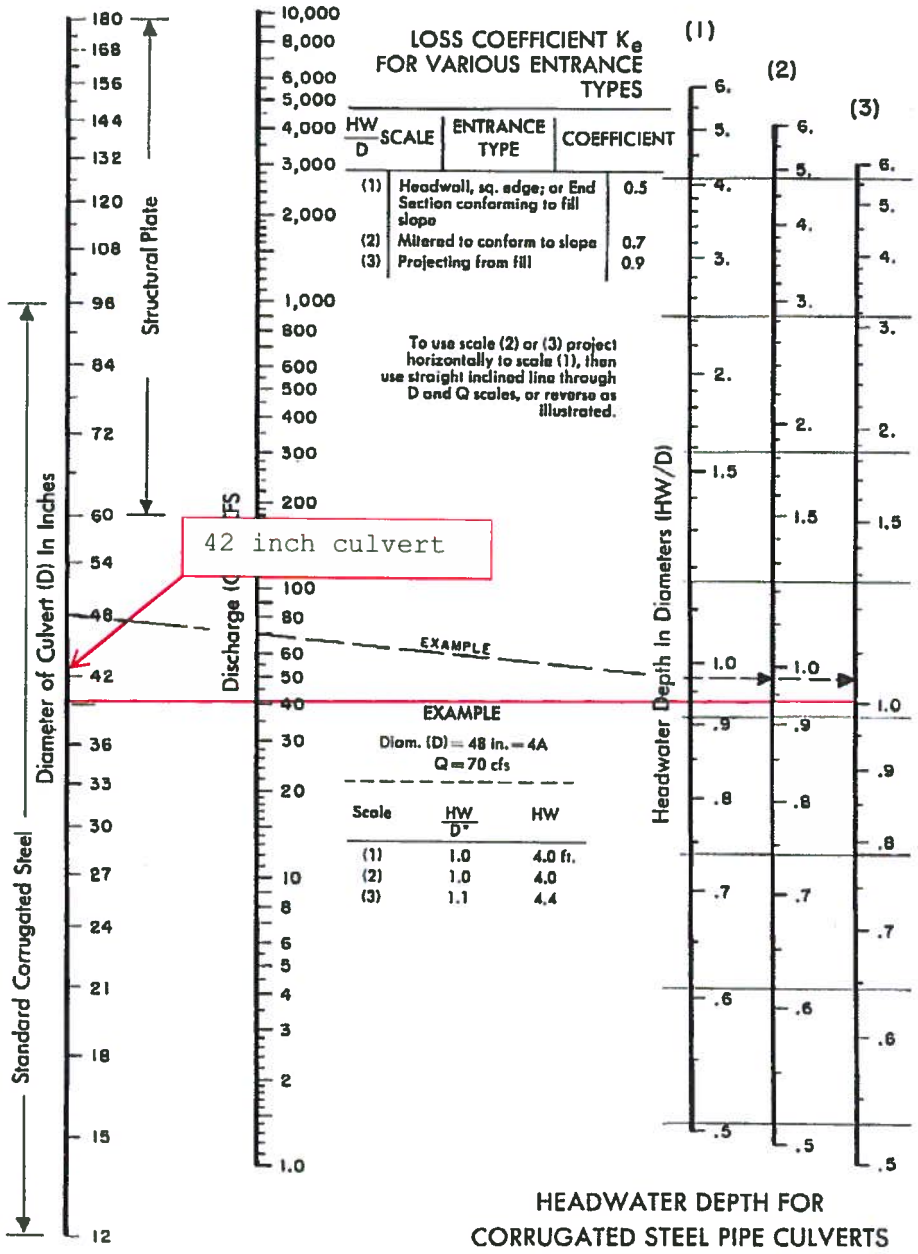
Same as Collection Ditch #3

Mine Water Post-Mine Ditch

```
Channel Design (Non-Erodible)
Channel Type:  Triangular, Equal Side Slopes
Dimensions:  Left Side Slope 2.00:1
             Right Side Slope 2.00:1
Wetted Perimeter:  2.32
Area of Wetted Cross Section:  0.54
Channel Slope: 5.0000
Manning's n of Channel: 0.0305
Discharge:  2.23 cfs
Depth of Flow:  0.52 feet
Velocity:  4.12 fps
Channel Lining:  Excavated, No Vegetation
Freeboard:  0.30 feet
```

General Culvert Designs

Design Requirements:
Flow = 40.0 cfs
HW/D = 1.0
Projecting from fill
D = 42 inches



HEADWATER DEPTH FOR CORRUGATED STEEL PIPE CULVERTS WITH INLET CONTROL

Sediment Pond #1

Volume Report
Lower left grid corner : 1350616.75,483968.79
Upper right grid corner: 1350707.75,484175.79
X grid resolution: 91, Y grid resolution: 207
X grid cell size : 1.00, Y grid cell size: 1.00

Pond/Pit volume : 58,486.3 C.F., 2,166.16 C.Y., 1.34 Acre-Ft
Area: 12,193.1 S.F., 0.280 Acres
Elevation Range: 10652.00 to 10661.00

Storage Volumes

Elevation	Storage(AcreFt)	(C.Y.)	(C.F.)	(Gallons)	Area(Acre)
10652.00	0.00000	0.0	0.0	0.0	0.000
10653.00	0.05590	90.2	2434.8	18213.8	0.065
10654.00	0.12969	209.2	5649.3	42259.7	0.083
10655.00	0.22375	361.0	9746.5	72908.6	0.105
10656.00	0.34063	549.5	14837.6	110993.2	0.129
10657.00	0.48264	778.7	21023.9	157269.4	0.155
10658.00	0.65182	1051.6	28393.4	212397.1	0.183
10659.00	0.85021	1371.7	37035.1	277042.1	0.214
10660.00	1.07977	1742.0	47034.6	351843.5	0.246
10661.00	1.34266	2166.2	58486.3	437508.2	0.280

Sediment Pond #2

Volume Report
Lower left grid corner : 1351477.68,484099.51
Upper right grid corner: 1351592.68,484327.51
X grid resolution: 115, Y grid resolution: 228
X grid cell size : 1.00, Y grid cell size: 1.00

Pond/Pit volume : 97,761.7 C.F., 3,620.80 C.Y., 2.24 Acre-Ft
Area: 19,443.6 S.F., 0.446 Acres
Elevation Range: 10619.00 to 10626.00

Storage Volumes

Elevation	Storage(AcreFt)	(C.Y.)	(C.F.)	(Gallons)	Area(Acre)
10619.00	0.00000	0.0	0.0	0.0	0.000
10620.00	0.21990	354.8	9578.6	71653.1	0.236
10621.00	0.47152	760.7	20539.3	153644.3	0.268
10622.00	0.75604	1219.7	32933.2	246357.8	0.301
10623.00	1.07425	1733.1	46794.2	350044.6	0.335
10624.00	1.42739	2302.9	62177.2	465117.7	0.371
10625.00	1.81689	2931.3	79143.8	592036.9	0.408
10626.00	2.24430	3620.8	97761.7	731308.2	0.446

Mine Water Pond

Volume Report
Lower left grid corner : 1351605.90,484093.77
Upper right grid corner: 1351875.90,484289.77
X grid resolution: 270, Y grid resolution: 196
X grid cell size : 1.00, Y grid cell size: 1.00

Pond/Pit volume : 231,228.3 C.F., 8,564.01 C.Y., 5.31 Acre-Ft
Area: 37,876.0 S.F., 0.870 Acres
Elevation Range: 10618.00 to 10626.00

Storage Volumes

Elevation	Storage(AcreFt)	(C.Y.)	(C.F.)	(Gallons)	Area(Acre)
10618.00	0.00000	0.0	0.0	0.0	0.000
10619.00	0.49618	800.5	21613.5	161680.3	0.519
10620.00	1.03745	1673.8	45191.5	338056.2	0.564
10621.00	1.62485	2621.4	70778.4	529458.9	0.611
10622.00	2.25982	3645.8	98437.9	736366.8	0.659
10623.00	2.94391	4749.5	128236.6	959276.1	0.709
10624.00	3.67877	5935.1	160247.1	1198731.4	0.761
10625.00	4.46621	7205.5	194548.1	1455321.1	0.814
10626.00	5.30827	8564.0	231228.3	1729707.7	0.870

APPENDIX 12 REVENUE MINE – MINE WATER HANDLING SYSTEM

A) Introduction

It is planned that the mine water historically emanating from the mine portal will be handled by first channeling the water into a valve box near the portal, from which the water can go in any amount to a combination of four pipes:

Pipes 1 and 2: These are 8" Diameter DR- 11 HDPE pipes (aka weep lines) which will run at an approximate slope of 1% to the west of the portal as shown on Map G-10. The pipes will have ½" holes spaced every 6 to 12 inches along the pipe, which will be buried a minimum of 2 feet from the surface. The end of the pipes will be capped. These pipes will allow the mine water to enter existing waste rock in the mine surface area, where the water will enter the groundwater and will not have a surface flow into Sneffels Creek. Groundwater is monitored and tested from the 3 monitoring wells that are installed near Sneffels Creek, as shown on Maps C-2, C-3 and C-4. Also, surface water is monitored in Sneffels Creek immediately upstream and downstream of the mine permit area. The flow of water to the weep lines will be controlled to ensure that the mine water remains groundwater and does not surface to Sneffels Creek.

Pipes 3 and 4: These are 8" Diameter DR-9 HDPE pipe which have no perforations and will lead to a leach field constructed specifically to help reduce zinc from the mine water. The water flow will be split 50/50 to these 2 pipes. The flow may be adjusted to ensure even distribution on mine water throughout the leach field. There will be a 2-foot gap between the two pipes, which will be buried in the same trench.

The overall flow of water will be dictated by the water quality analysis. The purpose of these pipes is to allow a greater amount of zinc to precipitate out from the mine water.

From the leach field, the water will be collected in 3 HPDE pipes and delivered to a shallow Mine Water Pond, which will allow additional residence time prior to discharge into Sneffels Creek under the CDPHE discharge permit.

B) Leach Field Design

The purpose of the leach field is to allow the mine water to infiltrate through newly crushed waste rock in order to reduce the soluble zinc concentration in the water before discharging it into Sneffels Creek.

This is accomplished by excavation of an area in the existing waste rock of approximately 0.70 acres at a 2H:1V slope, lining this area and filling the area above the liner with crushed waste rock. Perforated HDPE water delivery pipes will be located at the top of the leach filed bringing the mine water from the portal. Perforated HDPE water gathering pipes will be located at the bottom of the leach field to collect the water above the liner and deliver it to the Mine Water Pond, prior to discharge in Sneffels Creek.

Map G-10 shows that two 8 inch diameter HDPE pipes of DR 11 will be used to convey the mine water to the leach field. These pipes will be buried from 2 feet to 4 feet from the surface. Prior to entering the leach field, a tee is placed in each pipe and two 8 inch pipes will continue from each tee. Each of the four pipes will have a control valve as shown on map G-11, and these valve stems will be brought to the surface in one single vertical culvert of approximately 6 feet diameter. The top of the valve box will be covered with a steel plate to protect the valves and their control wheels. Each of the 4 – 8 inch diameter HDPE pipes after the valve box will be perforated for delivery of the water to the leach field. These pipes are called the Upper Water Delivery Pipes. These delivery pipes will have ½" holes spaced every 6-12 inches along the pipe, which will allow the mine water to percolate though waste rock that has been freshly crushed on site to a size range of 1.5 inches minus. These pipes will be buried from 2 feet to 4 feet from the existing surface. The plan view location of the delivery pipes is shown on Map G-11.

The leach field area will be lined with a 45 mil Polypropylene liner that is protected on both sides to prevent puncturing. Once the existing waste rock is excavated to the required configuration, this layering system will be placed on the sides of the area to a maximum slope of 2.0H:1V and along the bottom of the leach field to contain the water within the leach field and prevent infiltration of the mine water into the ground. The lined area will be approximately 0.70 acres in area. The Polypropylene liner will be anchored in a trench at the top of the leach field. This trench will be 2 feet deep, and the liner will then extend two feet

horizontally in the trench. Waste rock crushed to minus 1.50 inches will then be put in place over the trench to hold the Polypropylene in place. See the details on Maps G-11 and G-12. A geocomposite liner will be placed on both sides of the polypropylene to protect it from puncture as well as provide strength for the weight of waste rock and tailings that will be placed above it. This geocomposite has a rigid plastic web that provides strength for the Polypropylene liner so that it does not puncture or rip under the weight of the waste rock and tailings that will be placed above it.

A picture of the geocomposite liner is shown below:

Picture 1 – Geocomposite showing felt layer and rigid plastic web

As shown on Map G-11, the leach field consists of the main 8"HDPE pipes entering a valve box where the water can be directed to 2 perforated 8" diameter DR-11 HDPE pipes which will be buried approximately 3-5 feet. This material will be placed over the EPDM liner to an

approximate depth of 22 feet (10670 ft to 10648 ft). The water movement through the waste rock will reduce the zinc concentration in the water. At the bottom of the freshly cut waste rock, 3 perforated 8" diameter DR-8 HDPE gathering pipes will collect water the mine water and deliver it to the designated mine water pond. These pipes will have ½" holes spaced every 6-12 inches along the pipe, which will allow the mine water to be collected for delivery to the Mine Water Pond. Sand will be placed around these pipes together with Miraf1 160-N fabric to protect these pipes from accumulating silt. These pipes are called the Gathering Pipes. A special boot seal will be placed at the location where these 3 pipes exit the polypropylene liner on the slope. The design details of the boot seal are supplied by the manufacturer and are included in Appendix 14. Silver Star commits to installing these boot seals according to the manufacturers recommended procedures.

i. Leach Field Construction Sequence

A professional engineer experienced in this type of work must be present to observe and approve all steps in the installation. The Division will be notified as to the proposed start of construction and Silver Star commits to following all recommended procedures for the installation based on manufacturer's recommendation. This includes the time of year that the installation is to be done. The construction sequence of the Leach Field will proceed in following order (see Maps G-10, G-11, and G-12 for diagrams):

1. Excavation of existing waste rock material to desired depth of 10,647 feet elevation and slope of 2.0H:1 V. Top of excavation should be approximately 10670 ft.
2. Survey to verify proper depths and slopes.
3. Subgrade should be compacted and graded to provide smooth, even surface. A small dozer or other compaction equipment can be used to accomplish this work.
4. Visual inspection of sub grade to remove any remaining protruding rocks.
5. Apply 6-8" of crushed rock (minus 1/4-inch) to entire leach field footprint and compact using small D-6 size dozer or other compaction equipment. Measure thicknesses at intervals of no less than 50 feet to verify thicknesses. Visually inspect the compacted surface for protruding rocks and remove them or bury them.

6. Lay down lower Geocomposite material using manufacturers recommended procedures shown in Appendix 14. This provides rigidity and strength for the polypropylene liner. Professional engineer will certify the installation.
7. Place 45 mil Reinforced Polypropylene liner above the compacted minus ¼ inch waste rock. The liner will be joined and overlapped using manufacturers recommended procedures shown in Appendix 14. An on-site heat fusion process is used. No deviation will be allowed except with approval of the engineer. Any significant changes will be discussed with and approved by the Division prior to actual implementation. Liner panels are laid out according to plans supplied by manufacturer. The polypropylene liner will be seamed by an IAGI (International Association of Geosynthetic Installers) certified installer, using the heat fusion welding equipment that is standard for this installation. During liner placement and seaming, subgrade must be kept free of standing water. If subgrade becomes wet and unstable, it must be dried and recompacted. Professional engineer will inspect installation for any leaks. A Professional Engineer will certify the installation.
8. A second layer of the geocomposite will be placed above the polypropylene liner for strength using the same manufacturers procedures.
9. The Polypropylene liner and geocomposite will be anchored in a trench along the entire perimeter of the leach field as shown on the Cross Section in Map G-12. The material placed as backfill in the trench is compacted using a hand operated vibratory compactor.
10. Conduct electrical leak test on all areas of the liner. This test is performed by Leak Location Services, Inc. of San Antonio Texas. The details of this test are included in Appendix 14. This test is very valuable since the area does not have to be backfilled with water to conduct the test.
11. Apply 8-10" of crushed waste rock (minus 1/4-inch) to entire leach field footprint. The liner will be laid out in sections to allow easy access for spreading out the gravel prior to installation of the next liner section. No material should be brought across the liner slope in heavy equipment. The material should be delivered using a track hoe that

carefully delivers the material to immediately above the geocomposite without a vertical drop exceeding 2 feet. If necessary, a ramp could be constructed to the bottom to allow a bobcat to haul and spread the gravel. The material can be spread out using a skid steer that is lowered to the bottom once a pad of fine waste rock has been created there. Gravel thicknesses will be measured at intervals of no less than 50 feet to verify depth. Also, the measurements will confirm that finished elevations are within 1-2 inches of the designated elevations on the Cross Section of Map G-12.

12. Place sand at the bottom of the gathering pipe locations to the required depth of 6 inches prior to placement of the perforated HDPE Gathering Pipes. The sand material should no more than 5% material less than 70 mesh size. Survey the elevations for proper pipe installation. The sand should be placed according to the cross section shown on Map G-12.
13. Place the three 8 inch diameter HDPE Water Gathering Pipes according to the designated elevation in the leach field and cover with Mirafi 160-N fabric per manufacturer's specifications for overlapping. Place sand on all sides of the gathering Pipes as shown on the Cross Section of Map G-12.
14. Place the Boot Seal of the three pipes through the liner sequence as per the manufacturers recommendations included in Appendix 14.
15. Once the boot seals are in place, fuse additional sections of 8 inch HDPE pipe DR-9 (unperforated) in a trench of 6 feet width with sand on all sides in the same manner as in the leach field. Place waste rock above the pipes to a depth of at least 2 feet. The pipes should be placed to the Mine water Pond, as shown on the plan view of map G-11.
16. Place crushed waste rock of size minus 1-1/2 inches in the leach field in layers of 12 inches to 18 inches at a time spread evenly over the entire leach field. No large piles of material shall be placed in the leach field in any one location. Fill the leach field to the approximate elevation of 10670 feet.
17. Excavate trenches of 3 feet depth and 1.5 feet wide in all locations in the leach field where the Upper Water Delivery Pipes will be located. Each pipe trench shall be excavated such that the total elevation drop over the course of each trench is 2.0 feet

from the valve box to the end of the pipe. Using this elevation drop, the survey stakes for the trenches should be placed prior to excavation.

18. Place the fused sections of HDPE perforated pipes (Upper Water Delivery Pipes) in the trenches after the elevations have been confirmed.
19. Apply 12-36" crushed rock (minus 1 -1/2 inch) to trenches after pipe installation to the original ground level of approximately 10670 ft.
20. In case there is a problem at a later date with any of the Water Gathering Pipes, an emergency spillway will be installed at the top of the polypropylene liner, as shown on Map G-11. This spillway will be 30 inches wide at the bottom, a depth of 1.5 feet, 2H:1V sideslopes and a lining of 12 inches of grouted durable rock of 4 inch to 6 inch diameter. The bottom of the finished channel will be installed at an elevation of 10669.5 ft elevation. See Map G-11 for the approximate location of the spillway.

The synthetic materials will be constructed in a timely manner to conform to the manufacturer's product use and installation recommendations.

An on-site PE will document the construction and installation of all sequences of the leach field and mine water pond. The documentation will include written notes with dates and photographs. The Division will be given 24-hour notice prior to initiation of each construction phase of the EPFs (Environmental Protection Facilities, namely the Mine Water Pond and the Leach Field with all associated piping. A Final As -Built Certified Report will be supplied to the Division once the facilities have been completed.

ii) <u>HPDE Pipe Stability</u>

The gathering pipes used at the bottom of the leach field will be made of DR-9 HDPE pipes. The Handbook of PE Pipe lists the critical buckling (collapse) pressure for unconstrained DR-9 HDPE Pipe as 138 psi for a 50-year service life. The estimated density of the leach field fill material (80% rock and 20% water) is 142.27 lb/ft3 or 0.0823 lb/in3. The 22 feet of crushed waste rock above the leach field will result in a pressure of 21.72 lb/in2. The estimated density of the tailings material is 130 lb/ft3 or 0.075 lb/in3. To reach the maximum allowable pressure on the DR-9 HDPE gathering pipes, the depth of the tailings pile would

have to be 128 feet. The leach field depth is 22 feet and the estimated tailings pile over the top of the leach field is 32 feet. The estimated pressure from the tailings pile (in the area on top of the leach field) is 28.87 lb/in2. The combined estimated pressure on the DR-9 HDPE gathering pipes is therefore 21.72 psi plus 28.87 psi or 50.6 psi. The estimated pressure on the DR-9 HDPE gathering pipes is well within the maximum allowable pressure of 138 psi. The DR-9 HDPE gathering pipes will also be heavily protected from surface weight and heavy equipment by the sand layers, gravel layers, and geocomposite layers.

C) Mine Water Pond Design

All water from the Leach Field will discharge into the Mine Water Pond prior to discharge into Sneffels Creek. The purpose of the Pond is to allow additional zinc to drop out of the water since additional residence time will be provided by the Pond. This installation is permanent and will remain in place after mine reclamation. The discharge of water from the pond is through a grouted rock spillway that is also the measuring point for the Mine Water Discharge Permit with the CDPHE. The hydrologic demonstration showing that the spillway is adequate to handle the design flow is shown at the end of this section.

The three 8" diameter gathering pipes will each have a valve at their end in the Mine Water Pond, to allow for maintenance of the pond. The elevation of the bottom of the gathering pipes at the west end of the Leach Field is 10649.0 ft. The pipes will drop 2.0 feet over the length to the Mine Water Pond @ a grade of 1.5%, therefore, the elevation of the bottom of the pipe at the Mine Water Pond entrance is 10647.0 ft. The top of the embankment is 10649.5 ft so that the pipe stems only need to be 2.5 feet long to control the valves. Boot seals will be placed on all penetrations of the liner for the three gathering pipes.

The Mine Water Pond is shown on Maps G-10 and G-11. All pertinent cross section details are shown on Map G-12. The pond will be excavated to the dimensions as shown on Map G-11, and will hold a volume of approximately 1,417 cubic yards. The bottom of the pond will be excavated to elevation 10645.0 ft and the top of the incised embankment will be 10649.5 ft. The bottom of the spillway is 10648.5 ft, making the total depth 1.0 ft. This is the primary discharge device to Sneffels Creek. The calculations at the end of this section show that the

spillway is more than adequate to handle the maximum flow of 1000 gallons per minute from the mine with more than 0.5 feet of freeboard in the spillway. One foot of freeboard is not needed since no drainage area enters this pond and therefore no surface runoff will enter it except for the minor area of the pond itself. The pond will have a surface area of water below the spillway of 0.21 to 0.24 acres. A 4" diameter Schedule 40 PVC pipe will be placed in the pond bottom and will discharge to Sneffels Creek only if maintenance is needed to the pond and it would need to be fully drained. A valve on the inlet will be closed during normal operation. Map G-12 also shows the cross section of the pond and the spillway detail. Since the bottom of the pond is at elevation 10645.0 ft, the pond depth from the bottom to the bottom of the spillway is only 3.5 ft.

The pond will be lined with one layer of geotextile fabric of the specification of 16 ounces weight per square yard followed by the same 45 mil reinforced polypropylene liner used in the Leach Field.

The 45 mil Polypropylene liner is used in place of an EPDM liner since it is much stronger in tension on the slope. The pond slopes are excavated to a maximum of 2.0H:1V slope on the inside and will be excavated from existing waste rock on site. The Polypropylene liner will be anchored in a trench at the top of the pond. This trench will be 2 feet deep, and the fabric will then extend two feet horizontally in the trench. Crushed minus ¼ inch waste rock will then be put in place over the trench to hold the liner in place. The pond therefore will actually be incised and will be created from the excavation and its height is no more than 4.5 feet measured anywhere from the pond bottom to the top. Since the Polypropylene liner is needed to prevent percolation, the embankment will be excavated out of existing waste rock, which is permeable, has no cohesion and has an angle of repose of approximately 40 degrees, as seen on site in the existing piles. All strength of this material is from internal angle of friction. Since the 2H:1V slope has an angle of 26.6 degrees, the slopes are very stable. The existing waste rock piles at the mine have been in place for over 100 years on site at angles of 38 to 40 degrees without any stability problems.

i) Mine Water Pond Construction Sequence

A professional engineer experienced in this type of work must be present to observe and approve all steps in the installation. The Division will be notified as to the proposed start of construction and Silver Star commits to following all recommended procedures for the installation based on manufacturer's recommendation. This includes the time of year that the installation is to be done. The construction sequence of the Mine Water Pond will proceed in following order (see Maps G-10, G-11, and G12 for diagrams):

1. Excavation of existing waste rock material to desired depth of 10,645 feet elevation and slope of 2.0H:1 V. Top of excavation should be approximately 10649.5 feet. Staking of the perimeter should be made prior to installation.
2. A horizontal bench of approximately 8 feet width should be constructed around the perimeter of the pond for cleanout and maintenance.
3. Survey to verify proper depths and slopes. Verify any water presence in the pond bottom.
4. Install French Drain per specifications shown on Maps G-11 and G-12 to ensure that all water from Atlas Creek will not flow through the ground and enter the Mine Water Pond.
5. Subgrade should be compacted and graded to provide smooth, even surface. A small dozer or other compaction equipment can be used to accomplish this work.
6. Visual inspection of sub grade to remove any remaining protruding rocks.
7. Apply 6-8" of crushed rock (minus 1/4-inch) to entire Mine Water Pond footprint and compact using small D-4 or D-6 size dozer or other compaction equipment. Measure thicknesses at intervals of no less than 50 feet to verify thicknesses. Visually inspect the compacted surface for protruding rocks and remove them or bury them.
8. Install 4 inch Schedule 40 PVC pipe with valve at pond bottom as shown on Map G-12 to allow draining of the pond.
9. Confirm that finished elevations are within 1-2 inches of the designated elevations on the Cross Section of Map G-12.

10. Lay down lower Geotextile material and join and overlap using manufacturers recommended procedures shown in Appendix 14. The geotextile material has a weight of 16 ounces per square yard. A Professional engineer will certify the installation.
11. Place 45 mil Reinforced Polypropylene liner above the compacted minus ¼ inch waste rock. The liner will be joined and overlapped using manufacturers recommended procedures shown in Appendix 14. An on-site heat fusion process is used. No deviation will be allowed except with approval of the engineer. Any significant changes will be discussed with and approved by the Division prior to actual implementation. Liner panels are laid out according to plans supplied by manufacturer. The polypropylene liner comes in sections that are in an accordion type roll which will be seamed by an IAGI (International Association of Geosynthetic Installers) certified installer, using the heat fusion welding equipment that is standard for this installation. During liner placement and seaming, subgrade must be kept free of standing water. If subgrade becomes wet and unstable, it must be dried and recompacted. A registered Professional engineer will inspect installation for any leaks. A registered Professional engineer will certify the installation.
12. Install the spillway to the dimensions, specifications and elevations of Map G-12. The top of the spillway is 4.5 feet from the bottom of the pond and the bottom of the spillway is 1.0 feet down from the top of the embankment, therefore, the pond water depth is only 3.5 feet to the spillway entrance. Elevations must be checked by the site surveyor.
13. The Polypropylene liner and geotextile will be anchored in a trench along the entire perimeter of the Mine Water Pond as shown on the Cross Section in Map G-12. The material placed as backfill in the trench is compacted using a hand operated vibratory compactor.
14. Place the Boot Seal of the three Gathering Pipes through the liner sequence as per the manufacturers recommendations included in Appendix 14. A similar boot seal is installed in the 4" PVC drain pipe.

15. Conduct electrical leak test on all areas of the liner. This test is performed by Leak Location Services, Inc. of San Antonio Texas. The details of this test are included in Appendix 14. This test is very valuable since the area does not have to be backfilled with water to conduct the test.
16. Place valves and valve stems on the 3 gathering pipes and the 4" PVC drain pipe. Extend stem to accessible area of bench at pond top.
17. Install Parshall flumes on the mine water exiting the portal to handle a variable flow from 200 gpm to 1000 gpm. A similar flume is placed at the CDPHE discharge point from the Mine Water Pond.

The synthetic materials will be constructed in a timely manner to conform to the manufacturer's product use and installation recommendations.

A flow measuring device such as a Parshall flume will be installed immediately before the point where the mine water enters the 8 inch HDPE pipes near the portal. Another flow measuring device such as a Parshall flume will be installed immediately at the discharge of the Mine Water Pond at the spillway of the Pond or immediately before the point where the spillway enters Sneffels Creek. If there is reasonably significant difference in the flow at the two locations, a dye leak test will be performed by infusing the leach pad with a certified bio-degradable dye. For purposes of precision, a difference in flow of 15% will be considered significant. Evaporation will occur from the Mine water Pond which does not mean that a leak exists. If a dye test is performed, and after the dye is infused, over the following 3 days, observations along Sneffels Creek will be made by a qualified person for evidence of the dye. If the dye is seen entering the Creek or in the Creek, the Division will be consulted to determine if any repairs need to be made to the leach field.

An on-site PE will document the construction and installation of all sequences of the leach field and mine water pond. The documentation will include written notes with dates and photographs. The Division will be given 24-hour notice prior to initiation of each construction phase of the EPFs (Environmental Protection Facilities, namely the Mine Water Pond and the

Leach Field with all associated piping. A Final As -Built Certified Report will be supplied to the Division once the facilities have been completed.

ii) Mine Water Pond Hydrology

The top of the pond will have a trapezoidal spillway cut into it of 1.0 feet depth, 3.0 feet bottom width and the maximum height of water flow will be 6 inches, leaving 6 inches of freeboard. This pond will never see storm runoff so the freeboard does not need to be the normally acceptable 1.0 feet of height. The maximum flow from the mine is approximately 1000 gallons per minute. Using a trapezoidal spillway of 2:1 sideslopes, a 2% grade, a spillway lining of smooth grouted riprap, the capacity of this channel is approximately 1000 gallons per minute based on a Manning's formula calculation using a Manning's n of the grouted riprap of 0.025. The mine water pond spillway will be channeled into a trapezoidal channel made of grouted riprap. The channel will have the same dimensions: 1.0 feet depth, 3.0 feet bottom width and the maximum height of water flow will be 6 inches, leaving 6 inches of freeboard, which will deliver the water directly to Sneffels Creek at the edge of the permit area. A cross section of this spillway is shown on Map G-12. The polypropylene lining the pond will be grouted into the grouted riprap spillway to prevent undercutting. In this way, no energy dissipation is needed at the bottom of the culvert. See below for the hydrology calculations using the minimum mine water flow of 200 gpm (0.45 cfs) and maximum of 1000 gpm (2.23 cfs).

iii) French Drain

Since the approximate level of Atlas Creek west of the mine water pond is 2-3 feet higher than the bottom of the Mine Water Pond, there is potential for water from the Creek to enter this pond. Since this would complicate the installation and performance of the pond liner, this water will be channeled to Sneffels Creek through the use of a french Drain installed to the west of the Mine Water Pond and east of Atlas Creek. This french drain is shown in plan view on Map G-11 and in Cross section and profile on Map G-12. It will be constructed to the specifications shown on these maps, using river rock and Mirafi 160 N fabric. The beginning of the french drain will have a depth of approximately 4.5 feet (10,649' to 10,644.5'). The end of the french drain will daylight into Sneffels Creek at an approximate elevation of 10,642.5. The depth of the french drain varies significantly as shown on the Map G-12 cross-section. The

overall length of the french drain is approximately 150 feet. The general slope of the french drain is approximately 2.8%.

iv) Mine Water Pond Spillway

Channel Design (Non-Erodible)
(using Manning's Formula from Survcadd)

Minimum Flow

Channel Type: Trapezoidal, Equal Side Slopes
Dimensions: Left Side Slope 2.00:1
Right Side Slope 2.00:1
Base Dimension: 3.00
Wetted Perimeter: 3.39
Area of Wetted Cross Section: 0.28
Channel Slope: 2.0000
Manning's n of Channel: 0.0250
Discharge: 0.45 cfs (200 gpm)
Depth of Flow: 0.09 feet
Velocity: 1.59 fps
Channel Lining: Concrete Rip-Rap Sides
Freeboard: 0.91 feet

Maximum Flow

Channel Type: Trapezoidal, Equal Side Slopes
Dimensions: Left Side Slope 2.00:1
Right Side Slope 2.00:1
Base Dimension: 3.00
Wetted Perimeter: 4.02
Area of Wetted Cross Section: 0.79
Channel Slope: 2.0000
Manning's n of Channel: 0.0250
Discharge: 2.23 cfs (1000 gpm)
Depth of Flow: 0.23 feet
Velocity: 2.83 fps
Channel Lining: Concrete Rip-Rap Sides
Freeboard: 0.77 feet

The mine water pond spillway is shown in plan view on the attached Map G-11. A cross section of the spillway is enclosed on Map G-12. The NPDES discharge point for the Mine water Discharge Permit with the CDPHE will be at the end of the spillway, just before the water enters Sneffels Creek. This measuring point will record flow and temperature, as required by the permit. Samples will be taken for analysis and submitted for lab testing. All of these analyses will be sent to the Division as part of the Water Reports, as they are compiled.

D) Engineering Statement

The worst case slope stability item in all of the construction of the mine water pond and the leach field is the installation of the minus ¼ inch gravel above and below the polypropylene liner at a slope of 2H:1V. The mine water pond is also excavated to this angle, but it is incised in angular waste rock which has a steeper friction angle of approximately 40 degrees.

The Factor of Safety (FOS) for minus -1/4 inch gravel with a 2.0H:1V slope, which is 26.6 degrees with an assumed internal angle of friction of 38 degrees (same as angle of repose for cohesion-less material), and simply evaluating the internal angle of friction as follows:

$$FOS = \frac{Tangent\ of\ Internal\ Angle\ of\ Friction}{Tangent\ of\ Actual\ Angle\ of\ Friction} = \frac{\tan 38°}{\tan 26.6°} = \frac{0.781}{0.501} = 1.56$$

This factor of safety is greater than the normal long-term safety factor of 1.3, therefore the plan of construction as presented is acceptable. The mine water pond outslope is specified as a minimum of 3H:1V, therefore this slope meets all long term requirements for a permanent pond.

In addition, Greg Lewicki and Associates met with Colorado Lining International, who is the vendor for the reinforced polypropylene, the geocomposite and the geotextile. The plans, slopes, areas and all dimensions of the Mine Water Pond and Leach Field were evaluated. The plans meet prudent engineering standards. The geocomposite has been specified to give the polypropylene liner strength under the weight of the waste rock and tailings that will be placed above it.

The Environmental Protection Facilities (EPFs) will either be constructed according to the final specifications that are approved by this office or if changes are made during construction which vary from the approved plan, construction will cease while changes are reviewed by the Colorado Division of Reclamation, Mining, and Safety.

I, Greg Lewicki, P.E., with over 28 years of experience in mine slope safety analysis in Colorado, certify that the mine water pond presented in this application will lead to stable slopes during and after mining and that there is no realistic threat of failure or to the stability of any structures outside of the permit area.

Greg Lewicki

Greg Lewicki, P.E.

P.E.# 20335

Date: Monday, November 04, 2013

DRMS WORST CASE RECLAMATION BOND CALCULATION EXHIBIT L

The worst case reclamation scenario at the Revenue Mine will take place early in the mine life, after the initial regrading of the Revenue waste pile is complete. It is assumed that the underground development for the mill and additional underground storage will be completed at this point. It is at this time in the mine's life that the greatest amount of earthwork needs to be conducted for successful reclamation. The redesigned Mine Water Pond from TR-01 in September of 2013 will remain after reclamation. The Sneffels Diversion has been abandoned and will not be installed. All sediment ponds will be backfilled and reclaimed. All collection ditches and diversions will be maintained over the life of the reclamation process but will not be reclaimed. They will be allowed to fill in naturally. Worst case reclamation details are shown below:

- Grading all of the disturbed areas steeper than 3H:1V to 3H:1V. The retaining wall near the dry building will be bulldozed and backfilled as part of the reclamation process. All wood and steel will be removed from the site.
- Topsoiling of regraded areas. All of these areas will be topsoiled to a depth of 6 inches, but only enough topsoil will be available from stripping on site for 1.58 acres. The remaining area (10.86 acres) will require the import of topsoil. This amount includes the area of the new waste rock embankment constructed east of the portal area.
- All topsoil areas will need to be seeded and mulched.
- The underground storage portals and mill portal will have to be backfilled with an MSHA seal, and a bat gate will be installed on the Revenue tunnel portal.
- All chemicals used in the mill will be removed and properly disposed of off-site.
- The Filter Building is new and made of substantial concrete construction. It will remain and be used for storage of equipment, bobcat, weed spray tools, weed spray chemicals, erosion protection items, etc. This area of the site is designated for commercial use.
- The dry/office building is new and will remain after reclamation for storage of small equipment, fertilizer, weed spray equipment, etc. This area of the site is designated for commercial use.

- The access road and its associated gabion retaining wall will remain for site access after reclamation.
- The half-culvert ditches will be removed using large equipment (e.g. 966 loader), flatbed truck, and 2 personnel. The culverts will be taken to a landfill.

Since the reclamation plan does not call for the removal of all surface facilities, and the Atlas waste area will not have been developed yet, related reclamation will not be necessary. A detailed breakdown of each task and its associated cost is shown in Table L-1.

Details of main building construction details built as of September 2013 are shown below:

- Dry Room Building
  - 47' wide x 50' long x 28' tall "at peak"
  - Monolithic slab w/ pre footer. Grade Beam: 16" wide x 18" deep, Slab is 6" thick
  - RCM50 Rustable metal siding and roofing
  - In-Floor Radiant and Baseboard heating
  - Spray Foam Insulation
  - Propane Boiler Heat
  - The Dry room and office has showers, lockers, toilets, sinks, offices on the second floor
- Filter Building
  - 56' wide x 92' long x 35' tall "at peak"
  - Rat slab to bedrock, Micropyles under columns, Footers, 12' Walls and Slab
    - Rat slab: up to 5' of concrete over bedrock – one row of #5 rebar
    - Footers: 24x36" footers
    - Walls: 18" thick by 12' tall
    - Slab: 8" thick
  - RCM50 Rustable metal siding and roofing

- In-Floor Radiant and Baseboard heating
- Spray Foam Insulation
- Propane Boiler Heat
- The filter building has filter presses for dewatering the fine tailings prior to disposal.

- Switch Gear Building
  - 25' wide x 30' long x 17' high "at peak"
  - Rat Slab and Monolithic/Grade Beam Foundation
    - Rat Slab: up to 5' thick to bedrock
    - Monolithic Slab: Grade beam: 18"w x 30"d
    - Slab: 8" thick
  - RCM50 Rustable metal siding and roofing
  - No heat source
  - R-Max Rigid Foam Board and Spray Foam Insulation
  - The switch gear building has the transformers and switch gear that are used to supply the voltage needed for all site uses
- Battery Charging Building
  - 45' wide x 120' long x 24' tall "at peak"
  - Micropyle, Footer and Slab Foundation "dimensions TBD"
  - RCM50 Rustable metal siding and roofing
  - In-Floor Radiant, Forced Air and Baseboard heating
  - Spray Foam Insulation

The Filter Building is the location where the tailings are dewatered prior to exiting the building for permanent disposal in the tailings/waste rock piles. The water is recycled in the mill. Large filter presses will be installed in this building and will be removed for reclamation. The filters and associated piping will need to be removed for reclamation. This cost is included.

The Switch Gear Building houses the transformers and switch gear that provide the proper voltage for all the electrical uses on site. Since the dry building, battery building and filter building will

remain and will need heat and lights, the switch gear building should remain to provide this power from the electric pole on site.

The battery charger building is the structure that doubles as a snow shed to protect the portal from getting snowed in. This should remain to allow bat access. It will be very solid and also reflects the history of the site.

There are 4 - 500 gallon plastic potable water tanks near the main mine portal as shown on all mine maps. These tanks will be removed by pickup truck at mine closure.

The storage portals have installed metal gates which prevent entry and the landowner desires that these gates remain to allow future use of the underground storage which is protected from the weather. For this reason, no sealing cost for these portals is included. The main mine portal already has a large and very strong metal door with bat gate installed. No additional work is needed at this portal.

The 8000 gallon diesel tank on skids located east of the filter building will be hauled off site with its secondary containment at the time of mine closure. The two 55 gallon oil drums inside the storage will also be removed for reclamation.

There are two portable emergency generator trailers on portable truck trailers. These will be wheeled off site at mine closure. There are two 1000 gallon propane tanks near the 8000 gallon diesel tank, which will be removed at mine closure.

There are two septic tanks of 500 gallons each buried as shown on the mine maps. These tanks lead to s septic field which is a series of pipes placed on top of 4 feet of sand to allow infiltration into the waste rock below the sand. These tanks and septic field will remain after reclamation for site sanitation.

The future Mine Equipment Storage and Shop Building has not been built as of 2013. It is planned to be a portable Quonset hut building on a 6" thick concrete foundation. The approximate building dimensions are 145 ft long x 50 ft wide. Height will be 18 feet in the center tapering on both sides. The building is easily disassembled and moved off site for use at another location. This foundation will be backfilled by more than 4 feet of waste rock from the existing piles, topsoiled and reseeded, therefore, this foundation will not be removed.

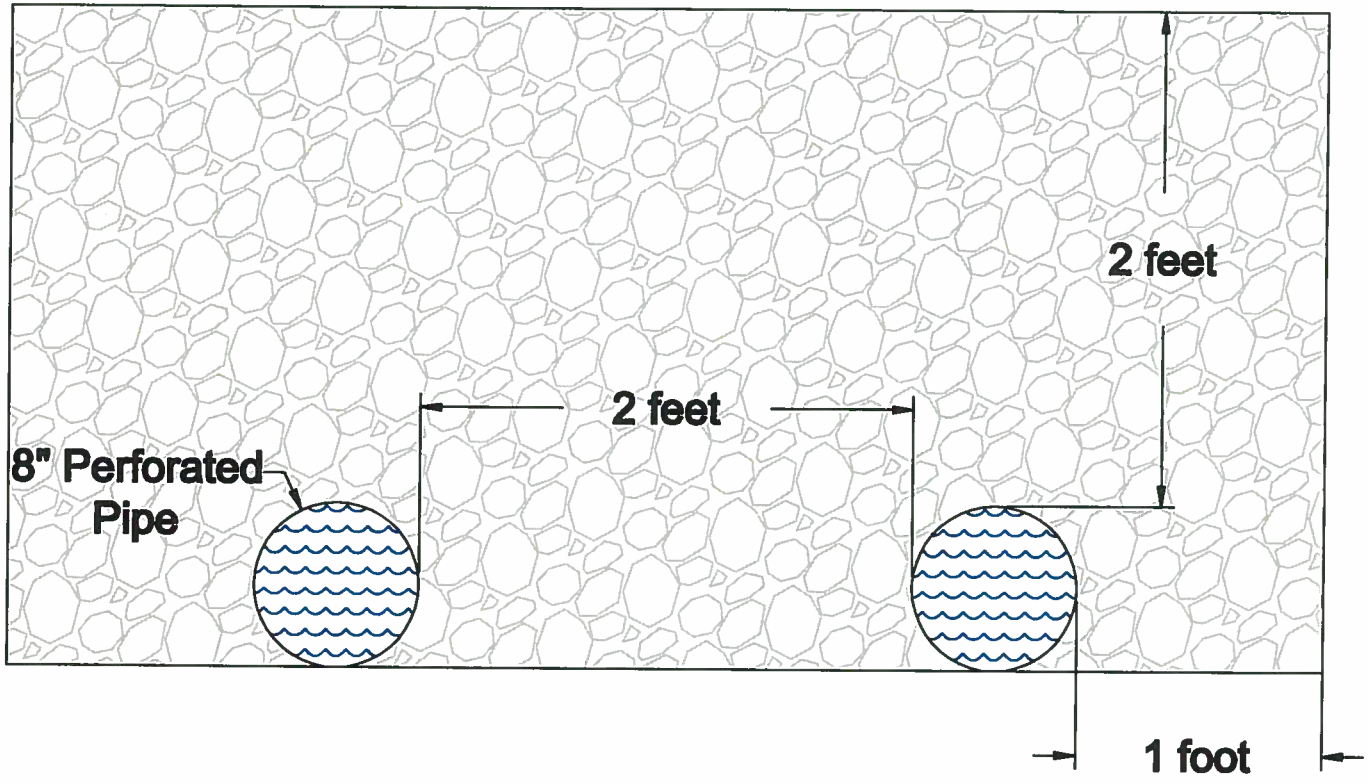
Table L-1 - Worst Case Reclamation Cost Summary

1	Grade all disturbed areas steeper than 3H:1V. Leave sediment ponds until reclamation is satisfory then remove them.	28,500	CY	$ 0.65	$ 18,525	6.0	0.50
2	Topsoil of regraded areas (10.86 acres). A total of 1.58 acres of this area can be topsoiled using material stripped from the Lower Pond Area. The remaining 9.28 acres' topsoil will be imported. All of these areas are topsoiled to a depth of 6 inches.	1,275	CY	$ 1.25	$ 1,593	3.0	0.25
		8,760	CY	$ 15.00	$ 131,406		
3	Seed all topsoiled areas with high altitude seed mix from reclamation plan.	10.86	acres	$ 650	$ 7,059	1.0	0.08
4	Mulch all seeded areas at 2000 lbs/acre	10.86	acres	$ 150	$ 1,629	1.0	0.08
5	Reinforce gates at underground storage portals, and mill portal. (3 portals)				$ 4,500	2.5	0.21
6	Reinforce gate at Revenue Mine portal				$ 3,000	0.5	0.04
7	Weed Control				$ 1,200	0.2	0.02
8	Structure Removal (See Table L-2)				$ 18,700	0.5	0.04
9	Half-Culvert Removal				$ 7,840	0.1	0.01
10	Mobilization				$ 10,000		
	Subtotal Direct Costs				$ 205,452		
	DRMS Overhead 28%				$ 57,527		
	Total Bond Estimate				**$ 262,979**	**14.8**	**1.23**

Table L-2: Building Inventory and Cost Summary of Building Removal

#	Structure	Construction	Foundation	Permanent	Post Mine Use	Reclamation Cost
1	Office/Dry Building	2 story	6" concrete slab/w rebar	Yes but remove certain inside items	Storage	$ 2400
2	Filter Building	2 story 6" concrete walls	12" concrete slab/ w rebar	Yes but remove inside equipment	Storage	$ 4000
3	500 gal Water Tanks (4)	Plastic 500 gallon tanks	None	No	None	$ 600
4	Snow Shed/Battery Charger Bldg	45' x 120' with track with metal siding	6" slab concrete	Yes but remove inside equipment	Storage	$ 1400
5	Crusher Retaining Wall	28 ft long x 16 ft high	Wood beams and steel beams	No	None	$ 4000
6	Septic Tank/Septic Field			Yes	None	$ 0
7	Access Road Retaining Wall	100 ft long gabions	None	Yes	Site Access	$ 0
8	Miscellaneous Surface Cleanup	Various materials on site	None	No	None	$ 3500
9	8000 gal diesel tank	Steel tank on skids	None	No	None	$ 500
10	Propane Tanks		None	No	None	$ 300
11	Mine Equipment Storage/Shop	145' x 50' Quonset Hut	6" foundation to be covered/reclaimed	Building No, Slab Yes	None	$ 2000
12	Switchgear Building	25' x 30'	Concrete slab	Yes	Electrical use	$ 0
	Total					**$18,700**

Weep Lines Trench Cross-Section



Notes:

DES: TRM DRN: TRM CHK: APP'D:	DATE 11/4/19 SCALE N/A	Greg Lewicki And Associates	Map G-13: Weep Line Trench Revenue Mine Star Mine Operations, LLC