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LEADVILLE MILL PERMIT

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(REV A)

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1.0 RULE 6.3.1: EXHIBIT A–LEGAL DESCRIPTION

1.1 LEGAL DESCRIPTION

As shown in **Figure 1-1** the Leadville Mill (Mill, or Process Facility) is located at:

NE1/4 NE1/4 Section 33 and SE1/4 SE1/4 Sec 28, T9S, R80W, 6th PM

Coordinates for the property entrance are:

N39°13’44.41”, W106°19’51.14” (39.2290028, -106.3308722)

The street address for the Mill is:

13815 Highway 24 South
Leadville, CO 80461

Figure 5-1 shows affected land, access roads, and adjacent owners.

Figure 1-1: General Location

2.0 RULE 6.3.2: EXHIBIT B–SITE DESCRIPTION

2.1 VEGETATION

2.1.1 NARRATIVE

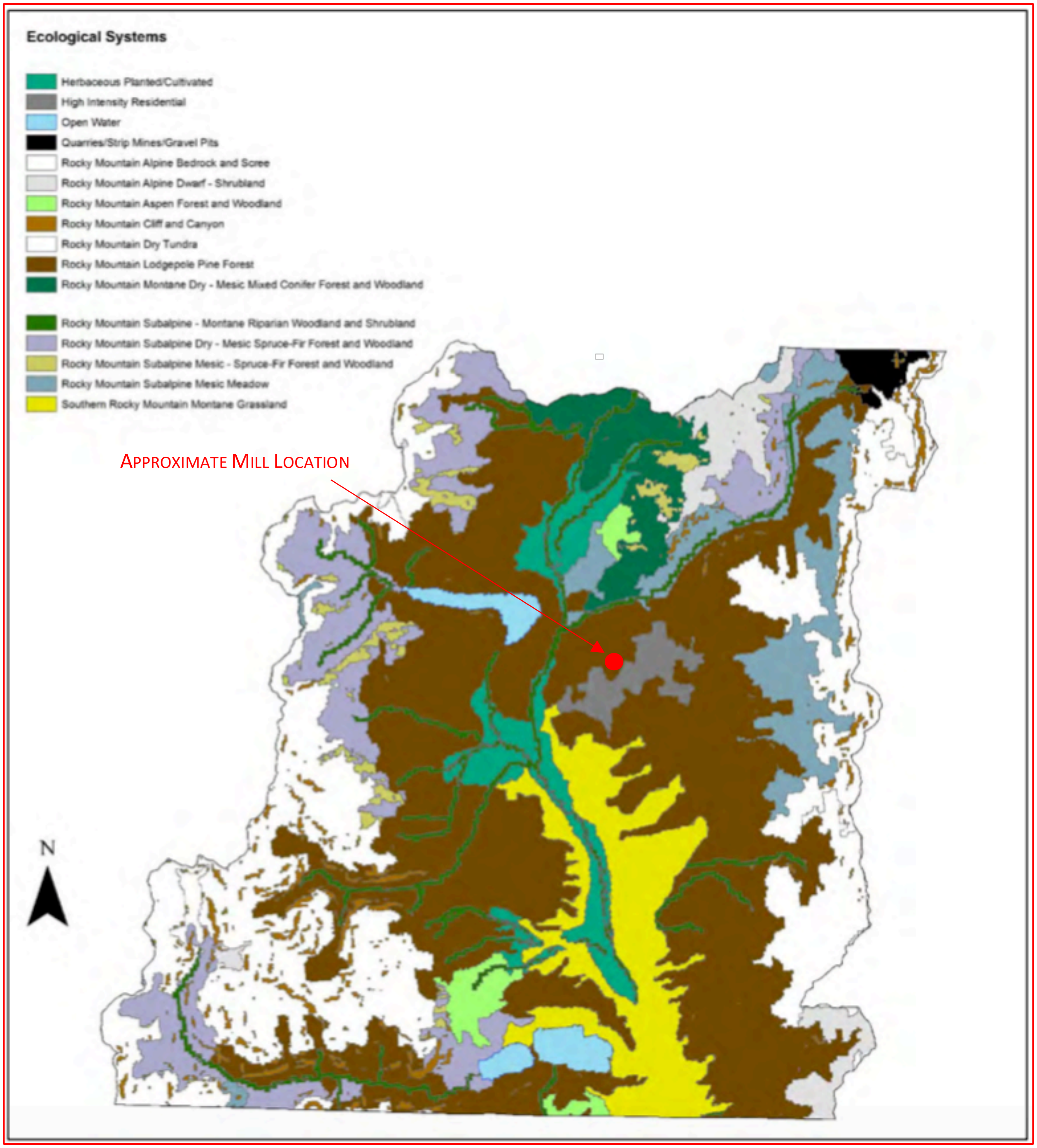
Lake County is dominated by subalpine and montane forests, and montane meadows – these ecological systems are characteristic of the Southern Rockies as shown in **Map 1**.

The ecological system with the largest coverage - and completely dominating the Leadville Mill property – is the Rocky Mountain lodgepole pine forest that includes 23.9% of the county, covering 58,421 acres (shown in brown in **Map 1**). The lowest coverage is High Intensity Residential development at less than 1% of the county. See **Table 2-1**.

The Rocky Mountain lodgepole pine forest (Pinus contorta) ecological system is widespread in upper montane to subalpine elevations of the Rocky Mountains. Most forests in this ecological system occur as early- to mid-successional forests which developed following fires. Following stand-replacing fires, lodgepole pine will rapidly colonize and develop into dense, even-aged stands. The majority of established stands range from 30ft to 40ft high. This system includes lodgepole pine-dominated stands that, while typically persistent for >100-year time frames, may succeed to spruce-fir; in the southern and central Rocky Mountains, it is seral to the Rocky Mountain Subalpine Dry-Mesic Spruce-Fir Forest and Woodland.

Soils supporting these forests are typically well-drained, gravelly, coarse-textured, acidic, and rarely formed from calcareous parent materials.

Map 1: Major Ecological Systems in Lake County



Source: Colorado Natural Heritage Program, 2019

TABLE 2-1: ECOLOGICAL SYSTEMS OF LAKE COUNTY

Ecological System	Acres	Percent
Rocky Mountain Lodgepole Pine Forest	**58,421**	**23.9%**
Rocky Mountain Subalpine Mesic Meadow	20,393	13.8%
Rocky Mountain Subalpine Dry-Mesic-Spruce-Fir Forest and Woodland	29,190	10.6%
Southern Rock Mountain Montane Dry-Mesic Mixed Conifer Forest and Woodland	19,738	10.4%
Rocky Mountain Alpine Bedrock and Scree	18,793	9.8%
Southern Rocky Mountain Montane Grassland	11,151	7.4%
Rocky Mountain Alpine Dwarf-Shrubland	11,300	4.5%
Rocky Mountain Alpine Turf	10,699	4.3%
Rocky Mountain Subalpine-Montane Riparian Woodland and Shrubland	10,579	4.0%
Herbaceous Planted/Cultivated	8,803	3.0%
Rocky Mountain Cliff, Canyon, and Massive Bedrock	7,012	2.4%
Rocky Mountain Aspen Forest and Woodland	4,720	1.6%
Quarries/Strip Mine/Gravel Pits	4,577	1.6%
Open Water	3,665	1.3%
Rocky Mountain Subalpine Mesic-Spruce-fir Forest and Woodland	3,796	1.3%
High Intensity Residential	2,923	0.1%
TOTAL	**245,760**	**100.0%**

Source: Comer et. al. 2003)

These forests are reportedly dominated by lodgepole pine with shrub, grass, or barren understories. The shrub stratum may be conspicuous to absent; common species include kinnikinnick (Arctostaphylos uva-ursi), twinflower (Linnaea borealis), Oregon grape (Mahonia repens), buffaloberry (Shepherdia canadensis), grouse-whortleberries (Vaccinium cespitosum, Vaccinium scoparium), and common juniper (Juniperus communis). The shrub stratum is absent at the Mill Property, and barren understories dominate the forest. Overall, less than 5% of understories consist of shrubs and grasses.

It is also reported that sometimes there are intermingled mixed conifer/aspen (Populus tremuloides) stands, with the latter occurring with inclusions of deeper, typically fine-textured soils. This is not the case at the Leadville Mill property, as there are no conifer or aspen stands.

The lodgepole pine forest in Lake County has not been as severely impacted by the massive mortality, as seen in the rest of the state, caused by the mountain pine beetle and the associated fungus that infects trees and interferes with its ability to transport water and nutrients.

The property is not suitable for hay meadows or cropland.

2.1.2 VEGETATION TYPES

Information in this exhibit is sourced from the April 2019 report prepared by the Colorado Natural Heritage Program, Warner College of Natural Resources, Colorado State University. The following excerpt is from the Executive Summary of this report.

> In September 2015, the Lake County Commissioners unanimously approved the Colorado Natural Heritage Program's (CNHP) project, Survey for Critical Biological Resources in Lake County. Funding was provided by the U.S. Environmental Protection Agency, Region 8 Wetland Program Development Grant, with matching funds from Colorado Department of Transportation and Colorado State University. In 2017, CNHP was awarded a Great Outdoors Colorado (GOCO) Conservation Excellence Grant to leverage and compliment the wetland project, with matching in-kind funds from Lake County, Central Colorado Conservancy, U.S. Forest Service, Colorado Mountain College, and Lake County Open Space Initiative. The main goal for both projects was to provide a scientific data resource for land managers, county planners, and the citizens of Lake County for conducting proactive landscape planning to preserve the natural biodiversity of significant habitats that support rare, imperiled and/or sensitive plants and animals.

Figure 5-2 is a map showing the lodgepole pine forest ecological system that dominates the Mill Property. The entire property consists of open growth to medium density lodgepole pine and an area of no vegetation, which occurs in the Arkansas valley slag area. The percentage totals for each respective are; 1) no vegetation is approximately 10%; medium density is approximately 10% and 3) open density is approximately 80%. No high-density areas are represented on the mill property. Representative stand samples are described in **Table 2-2**:

TABLE 2-2: REPRESENTATIVE STAND SAMPLES

Photo[1]	Density	Diameter Breast Height (dbh)	Height
1	Medium	4-6 inches	15-20 feet
2	Medium	6-10 inches	18-30 feet
3	Open	10-14 inches	45-60 feet

Following are representative photographs of the lodgepole pine forest on the Mill Property. The location of these photographs and the direction of the views are depicted **in Figure 5-2**.

Vegetation Photo 1

Facing South along gas pipeline, eastern fence boundary.

Vegetation Photo 2

Facing North

Vegetation Photo 3

Facing northeast toward southern boundary.

2.2 SOILS

The Mill sites soils shown in **Figure 5-2** is described as follows.

2.2.1 GEOLOGY

REGIONAL GEOLOGIC SETTING

The Mosquito Range, the study of whose geological structure formed a necessary basis for that of the ore deposits of the Leadville region, is the western boundary of the South Park, and has thus been considered from a topographical standpoint to form part of the Park Range. During Paleozoic times the boundaries of the depressions now known as the Parks were formed by the Archean land masses of the Colorado Range on the East and of the Sawatch and its continuation to the North, the Park Range on the West, and that the uplift of the Mosquito Range did not occur until the close of the Cretaceous.

Prior to this uplift the various porphyry bodies, which now form a prominent feature among the rock formations of the region, were intruded into the sedimentary beds deposited during Paleozoic and Mesozoic times, spreading out between the beds and sometimes crossing them, but being most uniformly distributed at the top of the Lower Carboniferous or Blue Limestone. It was in this limestone that the greater part of the ores (gold, silver, lead) were deposited, and the original deposition must have taken place after the intrusion of the porphyry and before the uplift of the range. In the uplift of the range both eruptive sheets and sedimentary beds, with the included ore deposits, were placated and faulted, and by subsequent erosion an immense thickness of rocks has been carried away, laying bare the very lowest rocks in the conformable series; the outcrops are, however, frequently buried beneath what is locally called "wash," a detrital formation of glacial origin. In the Leadville region, owing to the reduplication overturned fold caused by faulting, a series of outcrops of easterly dipping beds of the Blue Limestone are exposed beneath the wash, of which all are metalliferous, and a considerable proportion carry pay mineralized ore.

The district is a highly-faulted area; intruded with Tertiary quartz monzonite porphyries, on the East side of the Arkansas River graben, part of the Rio Grande Rift system.

The silver occurs associated with manganese and lead in veins, stock works, and manto-type deposits in the Mississippian Leadville Limestone (here a dolomite), the Devonian Dyer Dolomite, and the Ordovician Manitou Dolomite. Ore minerals are pyrite, sphalerite, and galena, in jasperoid and manganosiderite gangue. In upper levels, the ore minerals are oxidized to cerussite, anglesite, and smithsonite.

The site is located between the Mosquito Range to the East and the Sawatch Range to the West in Southern Rocky Mountain province. The province elevation ranges from

6,000ft to over 14,000ft. The rocks range in age from the Precambrian (950 to 1,800 million years old) consisting of igneous and metasediments largely granites, gneiss, and schist; and geologically recent Tertiary volcanic and intrusive rocks. The units are fractured crystalline aquifers that supply most of the domestic needs in the mountainous portion of the state. (Groundwater Atlas of Colorado, 2003).

ORE DEPOSITS

The principal ore deposits of Leadville occur, as summarized, in the Blue Limestone and at or near its contact with the overlying bodies of porphyry. The ores consist mainly of carbonate of lead, chloride of silver and argentiferous galena, in a gangue of silica and clay, with oxides of iron and manganese and some barite. These materials are mainly of secondary origin, and result from the alteration by surface waters of metallic sulfides. The study of these deposits has shown:

- Deposits were originally deposited as sulfides, and probably as a mixture, in varying proportions, of galena, and pyrite,
- Deposits were deposited from aqueous solutions,
- The process of deposition was a metasomatic interchanging between the materials brought in by the solutions and those forming the country rocks, consequently they do not fill pre-existing cavities,
- Ore currents from which they were deposited did not come directly from below, but were more probably descending currents, and
- Currents probably derived the material of which the ore deposits are formed mainly from the porphyry bodies, which occur at horizons above the Blue Limestone.

The geology is described in greater detail in USGS Professional Paper 148 by Emmons, Irving & Laughlin, 1927.

2.2.2 *LEADVILLE SERIES*

The Leadville series consists of deep, well-drained soils on mountains. These soils formed in stony and cobbly, medium-textured glacial outwash. Slopes range from 3% to 35%. Elevation ranges from 8,200ft to 10,000ft. The plant cover is generally lodgepole pine, Engelmann spruce, and subalpine fir. However, the Mill is exclusively lodgepole pine. The average annual precipitation is 16in to 20in. The average annual soil temperature is 38°F, and the average soil temperature in summer is 46°F. The frost-free season is 10 to 75 days.

In a representative profile, the surface layer is very dark brown sandy loam about 1in thick. The sub-surface layer is reddish-brown sandy loam that contains about 10% stones and is about 7in thick. The subsoil is yellowish-red and reddish-brown clay loam that contains 50% to 70% cobbles and stones and is about 32in thick. The substratum is reddish-brown loam that contains 70% stones. It extends to a depth of 60in. The soil is medium acidic in the surface and subsurface layers and slightly acidic or neutral in the subsoil.

Permeability in these soils is moderately slow, and the available water capacity is moderate. Effective rooting depth is 60in or more.

These soils are used for woodland, grazing, and recreation.

A small portion of the Affected Land is classified, MP – Mines and Dumps. This area contains slag material from the historic Arkansas Valley Smelter. There is no soil classification for this fragmented material.

2.2.3 REPRESENTATIVE SOIL PROFILE

Representative profile of Leadville sandy loam, 3% to 35% slopes, in a forested area 1.2mi East of Highway 24 on Lake County Road No. 6, in the SW¼ of Section 25, Township 9 South, Range 80 West, Lake County proximate to the local landfill facility.

02 – 0-0.5in, organic mat consisting mainly of charred organic matter.

Al - 0-1in, dark grayish-brown (l0YR 4/2) sandy loam; very dark brown (l0YR 2/2) moist; weak, fine, granular structure; soft, very friable, slightly sticky; many fine roots; medium acid; abrupt, smooth boundary.

A2 - 1-8in, pink (7.5YR 7/3) stony sandy loam; reddish brown (7.5YR 5/4) moist; moderate, thin, platy structure parting to weak, fine, subangular blocky; slightly hard, very friable, slightly sticky; common fine and medium roots; 10% stones and gravel; medium acid; clear, wavy boundary.

B&A - 8-14in, reddish-brown (5YR 5/4) and pink (7.5YR 7/3) very stony sandy clay loam; reddish brown (5YR 4/4) and brown (7.5YR 5/4) moist; moderate, medium, subangular blocky structure; hard, friable, sticky; common coarse and medium roots; thin patchy clay films on faces of peds; 5% gravel; 15% stones, 10in to 30in in diameter; slightly acidic; gradual, wavy boundary.

B21t - 14-21in, yellowish-red (5YR 5/6) extremely stony clay loam; yellowish red (5YR 4/6) moist; moderate, medium, prismatic structure parting to moderate, medium, blocky; hard, friable, sticky; common fine and medium roots; thin continuous clay films on faces of peds; some pink (7.5YR 7 /3) coatings of A2 material on faces of peds; 60% stones, 10in to 30in in diameter; slightly acidic; clear, wavy boundary.

B22t - 21-30in, reddish-brown (5YR 5/4) extremely stony clay loam; reddish brown (5YR 4/ 4) moist; moderate, medium and fine, subangular blocky structure; hard, friable, sticky; few *medium and coarse roots; thin nearly continuous clay films on faces of peds; 70% stones; neutral; gradual, wavy boundary.*

B3t - 30-40in, reddish-brown (5YR 5/4) extremely stony clay loam; reddish brown (5YR 4/ 4) moist; weak, medium, subangular blocky structure; hard, friable, sticky; few fine and medium roots; few patchy clay films on faces of peds; 60% cobbles and stones, 6in to 30in in diameter; slightly acidic; gradual, wavy boundary.

C - 40-60in, reddish-brown (5YR 5/4) extremely stony loam; reddish brown (5YR 4/ 4) moist; massive; hard, very friable, slightly sticky; 70% stones and cobbles, 10in to 30in in diameter; neutral.

The A2 horizon is brown or reddish brown. Reaction is 5.6 to 6.5. The B2t horizon ranges from reddish brown to yellowish red or brown. It is sandy clay loam, clay loam, or clay loam modified by stones or cobbles. Content of coarse fragments exceeds 60%. Reaction is 6.1 to 7.3. Depth to the C horizon ranges from 30in to 45in. Uncomformable strata of cobbles and gravel can occur below a depth of 40in in places.

2.2.4 LEADVILLE SANDY LOAM (LeE)

This soil is on mountain slopes in the east-central part of Lake County. Included with it in mapping are small areas of Troutville gravelly sandy loam and small areas that have bedrock at a depth of less than 20in, although these features do not exist at the Mill site. Surface runoff is medium to rapid, and the hazard of erosion is moderate. Most of this soil, including the entire Mill site, is forested with lodgepole pine and some ponderosa pine. Engelmann spruce and subalpine fir are at the higher elevations. This soil is used as range in areas that have been logged or burned. (Capability unit VIe-4, non-irrigated; woodland suitability group 1).

	Degree and kind of limitations for -					
Soil series and map symbols	**Septic tank absorption fields**	**Sewage lagoons**	**Shallow Excavations**	**Dwellings without basements**	**Local roads and streets**	**Campsites**
Leadville: LeE	Severe: moderately slow permeability	Severe: slope; high content of stones	Severe: high content of stones.	Severe: high content of stones; slopes of more than 15% in some places	Severe: high content of stones; slopes of more than 15% in some places.	Moderate where slopes are 3 to 15% Severe where slopes are more than 15% high content of stones.

Suitability as a source of				Soil features affecting-		
Road Fill	**Sand**	**Gravel**	**Topsoil**	**Embankment, dikes, and levees**	**Drainage of cropland and pasture**	**Irrigation**
Poor; high content of stones.	Unsuited	Unsuited	Fair: high content of stones	High content of stones: far compaction characteristics	Not Applicable	Not Applicable

2.2.5 SITE SPECIFIC SOIL SAMPLING

Onsite soil samples, shown in **Figure 5-2**, were collected, and analyzed. Soils are described in **Table 2-3**. Soil analysis was performed by ACZ Laboratories and is included in **Appendix 2-1**. Analysis tests are shown in **Table 2-4**. Analysis results are shown on **Table 2-5**.

TABLE 2-3: SOIL DESCRIPTION

Sample	001A	001B	002A	002B	003A	003B	004
Location	ECS - between embankment &	ECS - between embankment &	SE-ECS & access road	SE-ECS & access road	SE-ECS	SE-ECS	SW-ECS
Date	26-Jun-22	26-Jun-22	26-Jun-22	26-Jun-22	26-Jun-22	26-Jun-22	26-Jun-22
Time	900	900	900	900	900-1200	900-1200	900-1200
Latitude	N39º13'47.56"	N39º13'45.56"	N39º13'49.26"	N39º13'49.26"	N39º13'45.18"	N39º13'45.18"	N39º13'45.29"
Longitude	W106º19'52.54"	W106º19'52.54"	W106º19'49.26"	W106º19'49.26"	W106º19'51.99"	W106º19'51.99"	W106º19'58.60"
Weather	Clear	Clear	Clear	Clear	Clear	Clear	Clear
Temperature	40ºF	40ºF	40ºF	40ºF	40ºF	40ºF	40ºF
USCS Abbr.	Leadville Soil Series LeE	Leadville Soil Series LeE	Leadville Soil Series LeE	Leadville Soil Series LeE	Leadville Soil Series LeE	Leadville Soil Series LeE	Leadville Soil Series LeE
Depth	0.0" to 4.5"	4.5" to 10"	0.0" to 6.0"	6.0" to 10.0"	0.0" to 5.0"	5.0" - 10.0"	0.0" - 4.0"
Sample Type	Grab	Grab	Grab	Grab	Grab	Grab	Grab
Surface Cover	Short grasses, poderosa pine	Short grasses, poderosa pine	Short grasses, poderosa pine	Short grasses, poderosa pine	Short grasses - bare	Short grasses - bare	Short Grasses - ponderosa pine
Description	Dark to light reddish brown sticky friable	Light reddish brown sticky sandy friable	Light reddish brown sticky sandy friable	Light reddish brown sticky sandy friable - clayey at depth	Dark brown surface- light brown sticky sandy friable - more clayey at depth	Light brown sticky sandy friable-more clayey at depth	Dark brown surfce-light brown sticky sandy friable
Color	Reddish brown	Reddish brown sandy loam	Reddish brown sandy loam	Reddish brown sandy loam	drak grayish brown sandy loam very dark brown very friable	light brown very friable	reddish brown sandy loam very friable
Staining	-	-	-	-	-	-	-
Rooting	<4.5n - many fine roots	<10in - many fine roots	<6in - many fine roots	<10in-many fine roots	<3in-many fine roots	<10in-many fine roots	<4in-many fine roots
Moisture	moderate	low to moderate	moderate	moderate	low	low	moderdate
QA/QC	No	No	No	No	No	No	No
No. Containers	1	1	1	1	1	1	1
Preservatives	No	No	No	No	No	No	No
Comments	Slopes range from 1%-9%, formed in calcaareous, gravellu, medratelsy coarse. Capability unit - Vle-4 nonirrigated, woodland suitability group 1. Lodgepole pine.	Slopes range from 1%-9%, formed in calcaareous, gravellu, medratelsy coarse. Capability unit -Vle-4 nonirrigated, woodland suitability group 1. Lodgepole pine.	Slopes range from 1%-9%, formed in calcaareous, gravellu, medratelsy coarse. Capability unit -Vle-4 nonirrigated, woodland suitability group 1. Lodgepole pine.	Slopes range from 1%-9%, formed in calcaareous, gravellu, medratelsy coarse. Capability unit -Vle-4 nonirrigated, woodland suitability group 1. Lodgepole pine.	Slopes range from 1%-9%, formed in calcaareous, gravellu, medratelsy coarse. Capability unit -Vle-4 nonirrigated, woodland suitability group 1. Lodgepole pine.	Slopes range from 1%-9%, formed in calcaareous, gravellu, medratelsy coarse. Capability unit -Vle-4 nonirrigated, woodland suitability group 1. Lodgepole pine.	Slopes range from 1%-9%, formed in calcaareous, gravellu, medratelsy coarse. Capability unit -Vle-4 nonirrigated, woodland suitability group 1. Lodgepole pine.

TABLE 2-4: SOIL PREPARATION

Parameter	EPA Method
AB-DTPA Extraction	ASA No. 9, 3-5.2.3
Air Dry @ 34ºC	USDA No. 1, 1972
Cation Exchnage Capacity Extraction	USDA No. 60 (19)
Staurated Paste Extraction	USDA No. 60 (2)
Sieve-2000um (2.0mm)	ASA No. 9, 15-4.2.2
Sieve-250um (60 mesh)	ASA No. 9, 15-4.4.4

TABLE 2-5: SOIL ANALYSIS

Parameter	EPA Method	Units	001A & 001B Composite	002A & 002B Composite	003A & 003B Composite	004
Metals Analysis						
Calcium, soluble (Sat. Paste)	M6010D ICP	meq/L	0.1680	0.5950	<0.025	0.1850
Cation Exchange Capacity (CEC)	USDA No. 60 (19)	meq/100g	7.85	5.86	9.42	8.39
Copper, extractable (AB-DTPA)	M6010D ICP	mg/kg	107	6.21	142	23.5
Iron, extractable (AB-DTPA)	M6010D ICP	mg/kg	71.5	111	85	122
Magnesium, soluble (Sat. Paste)	M6010D ICP	meq/L	0.11	0.37	<0.08	0.38
Manganese, extractable (AB-DTPA)	M6010D ICP	mg/kg	2.99	1.71	4.82	15.1
Potasium extractable (AB-DTPA)	M6010D ICP	mg/kg	68.8	102.0	86.1	95.3
Sodium Adsorption Ratio	Calculation	-	0.22	0.10	<1	<1
Sodium , soluble (Sat. Paste)	M6010D ICP	meq/100g	0.08	0.07	<0.04	<0.04
Zinc, extractable (AB-DTPA)	M6010D ICP	mg/kg	5.61	126	38.6	68.1
Soil Analysis						
Conductivity @ 25C	SM2510B					
Conductivity	-	mmhos/cm	0.1200	0.0656	0.0418	0.0499
Max Particle Size	-	um	2000	2000	2000	2000
Temperature	-	C	21.8	21.6	21.3	21.0
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	%	0.1	0.2	<0.1	0.2
Organic Matter (Igniton @ 400)	EPA 600/2-78-054 M3.2.14	%	1.9	0.6	2.7	1.6
pH, Saturated Paste	EPA 600/2-78-054 Sec 3.2.2					
Max Particle Size	-	um	2000	2000	2000	2000
pH		-	3.9	5.4	4.4	4.8
Wet Chemistry						
Phosphorus, extractable (AB-DTPA)	M365.1 0 Automated Ascorbic Acid	mg/kg	3.83	9.34	4.81	2.36

2.3 MAN-MADE STRUCTURES

Figure 5-3 illustrates the location of all man-made structures. Structures and owners are listed in **Table 2-6**.

TABLE 2-6: STRUCTURES WITHIN 200FT

Owners	Structures	Utilities
Benson	Access Road	-
Dara/Fullone	Access Road	-
Woods	Access Road	-
Phillips	Access Road	-
Leadville Sanitation	Fence Finishing Pond	Sewer Line
Xcel	-	Powerline Gas Line

See **Appendix 12-1 through Appendix 12-5** for Structural Agreements.

See **Appendix 12-6** for Utility Letter.

See **Appendix 12-7** for Engineering Report.

2.4 WILDLIFE

2.4.1 NARRATIVE

The Mill property is 43.6 acres and the affected land is 7.2 acres. The property surrounded by the Leadville Sanitation polishing pond on the East, which is fenced, residential houses (on land zoned as Forestry Agriculture) to the West, and US Highway 24 to the South. As a result:

- There is no significant wildlife on the property,
- Limited deer and occasional elk migration, and
- De minimis effect on habitat and food supply.

The Mill and surrounding properties are all privately or municipally-owned. There is no specific seasonal use in the area.

No endangered species have been observed on the site. This has been confirmed by **Colorado Parks and Wildlife (CPW)**.

Due to the Mill's surrounding neighbors and lack of vegetation, wildlife habitat and food supply is minimal and will not be disturbed during and after the proposed operation.

2.4.2 CPW RECOMMENDATIONS

CPW was contacted to determine effective mitigations for wildlife protection. CPW recommendations and the action plan to address the recommendations are as follows.

REPORT DEAD ANIMALS

All dead animals discovered within the Permit Boundary will be reported immediately upon discovery. This includes animals found on or near the Mill access road from US Highway 24, as well as on the entire Arkansas Valley Slag (AVS) Property which is adjacent to the Leadville Mill Property.

MILL BORDER FENCE

CPW states that the best wildlife solution is to not have a fence around the Mill property. Removing the fence was approved Lake County **Community Planning Department (CPD)**, and this work was completed in Summer 2025. As approved, a small portion of wildlife-friendly fence proximate to the entrance gate and the North-South fence on the West side of the property that is between the mill property and neighboring houses remains.

2.5 WATER INFORMATION

2.5.1 NOT AFFECTING SURFACE OR GROUNDWATER SYSTEMS

CONTRIBUTING SURFACE WATER AND CONTROL SYSTEMS

The Leadville Mill property is not located in a flood hazard area according to the FEMA Food Insurance Rate Map: Community Panel No. 080282-0004 A, dated March 1, 1998. Therefore, no further reference to risk analysis, mitigation or surface control features related to flood hazard are included in this section.

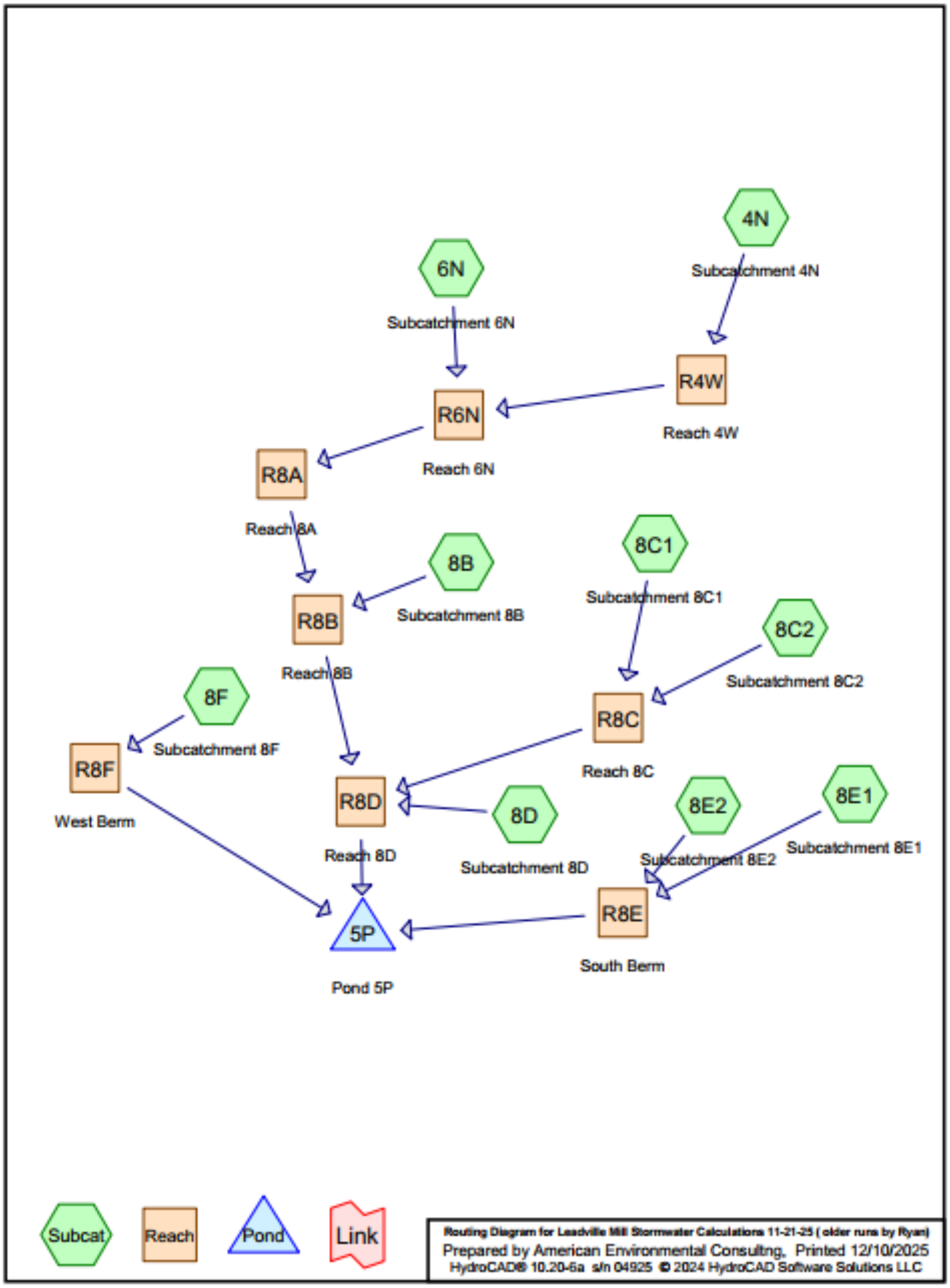
Mill processing and associated activities will not affect the surface water system as they have been designed with both primary and secondary containment structures that result in “zero-discharge” conditions from the perspective of discharge of any process pollutants off site. Process water and chemicals used in the milling process, as well as storm water, snowmelt, seepage that infiltrates through the dry tailings landfill (DTL), and sediment generated by surface water action within the DTL (i.e., “contact waters”) are contained within lined structures and returned to the milling circuit for reuse. Flows from other disturbed areas surrounding industrial or heavy equipment operations outside of the controlled DTL site or Mill building structures are managed and routed through engineered structures (ditches, berms and detention ponds). Flows from non-impacted existing ground surfaces are also routed around disturbed areas, are collected, and may discharge offsite at the two designated Outfalls (Nos. 1 and 2) where engineered structures provide access for sampling following event-based flows as described further in this Section.

The general surface water management strategy that has been adopted for the operation is based on isolation of the disturbed areas (see **Figure 5-3**) where industrial operations or ancillary facilities are constructed, from those undisturbed areas using both runon and runoff controls. **Figures 2-1** & **2-2** illustrate the basic components of the surface water management system and potential flow patterns as well as catchment and reach delineations in schematic form. Accumulated non-contact runoff exits the property via a sediment control pond and through Outfall 1 as the final surface water sampling structure. Sediment management is the singular focus of the surface water management plan, as all contact waters and process solutions are fully contained within controlled structures inside the mill building and ancillaries, in the adjacent Landfill leachate Collection Pond (LLCP), and within the lined areas of the Dry Tailings Landfill (DTL). Detailed modeling results for the individual catchments and conveyances are provided in **Appendix 2-2**. Disturbed or potentially disturbed areas are identified as within parts of Subcatchment 6 (and its respective internal subdivisions). The DTL has been designated as Subcatchment 7, but only collects direct precipitation and snowmelt and is not delineated on **Figure 2-2**. Calculated estimates of typical annual snowmelt and direct precipitation that may accumulate in the DTL are provided separately.

The Overburden Stockpile areas are located directly East and adjacent to the DTL and on the South side of the main access roadway (parts of Subcatchment 8). Any undisturbed drainage areas within the general Mill property boundary are identified collectively as Subcatchment 8 and have been further subdivided and shown on **Figure 2-1** to include the small contributing area on the adjacent property to the North of the main access road (6N), as well as a small area east of the main access road and west of the Water Treatment Plant property boundary. With the construction of the new access roadway directly north of the Water Treatment Plant (see Subcatchment 4B on **Figure 2-1**) waters that would normally flow into Subcatchment 6 to the West, are now diverted eastward on to the AVS property and flow southeasterly toward Outfall No 3 (AVS) which is located on the southeast corner of the Water Treatment Plant property.

Figure 2-1: Stormwater Catchment Boundaries & Features

Figure 2-2: Stormwater Catchment & Features Schematic



Small control berms and/or ditches have been located strategically in certain spots on the property (reference these proposed feature locations on **Figure 2-2** based on preliminary determinations using the 1-ft topo contours). The final locations of these sheet-flow control features will be designated after detailed reconnaissance and survey prior to plant commissioning. The general control strategy for the operation takes maximum advantage of the very favorable native topography, and these small additional control features act to maximize routing of all minor surface sheet flows toward the terminal detention pond near Outfall 1 area prior to any off-site discharge.

Only very minor volumes are expected to report to Outfall 2 based on the small contributing catchment 4B and these flows therefore do not contribute to discharges at the Mill Outfall No. 1.

To provide an assessment of the anticipated volumes of surface waters that will emanate from and be controlled within Subcatchments 4, 6 and 8, analysis of surface flows from the design 100-yr., 24-hr. storm was applied as a worst-case example for illustration. Based on the hydraulic modeling carried out for site-specific conditions and soil types, only storms generating volumes larger than those from the 10-yr/24-hr. events will likely produce visible concentrated flows. This conclusion is also based on anecdotal evidence from operator experience at the site for more than two decades. Under typical and more frequently observed conditions, most of the snowmelt and direct precipitation received at the site are absorbed by the native soils and produce very limited or no visual runoff.

The following provides a summary of the findings of the more conservative 100-yr/24-hr., with detail provided in **Appendix 2-2** that also includes individual catchment hydrographs and ditch geometries.

Figure 2-3: Surface Sheet Flow Sampling Basin (Outfalls 1 & 2)

SUMMARY MODELING RESULTS

The following presents a summary of the surface water modeling results. Detailed output can be found in **Appendix 2-2** which also includes hydrographs for individual catchments as well as conveyance geometry information.

For representative purposes, 100-year storm events were modeled to provide base case design and estimates of anticipated flows for an extreme event. Due to the nature of the site, topography, spoil types and relative areas of disturbance, under typical average conditions, sheet flow dominates and is difficult to characterize in terms of engineering of control structures and outfall volumes. Please refer to **Figures 2-1** and **2-2**, which illustrate specific details of the surface water system, routing, and modeling methodology.

INPUT PARAMETERS

- 100-year storm 2.48 in.
- Undisturbed Area Runoff Curve Number 69
- Disturbed Area Runoff Curve Number 87 from Hydrocad: Dirt roads, HSG C soil class
- Control ditches modeled as 2-foot deep, 3-foot bottom width, 3:1 side slopes
- Manning's number 0.035 for the control ditches

Model Output

Modeling was completed using the HydroCad model with the above input parameters. The modeling run is attached as **Appendix 2-2**.

ROUTING

Runoff from the above Subcatchment is routed per the schematic overview provided on **Figure 2-2**.

- Outfall No. 1 – Receives waters from Subcatchment 6 and undisturbed and non-contact disturbed flows from Subcatchments 4 and 8 which also includes small down-gradient areas below and adjacent to the DTL.
- Outfall No. 2 -Receives waters from Subcatchment 4B only.

- Landfill Leachate Collection Pond (LLCP) – Receives direct precipitation and snowmelt as collected in the DTL underdrain system, which is utilized as process makeup water during operations prior to capping and final reclamation of the DTL. (See Section 3.5 and **Figure 3-11** through **Figure 3-14** for design details). The LLCP also serves as the emergency sump for the plant. and has an operational design capacity of approximately 200,000 USG.

POND CAPACITIES

- The LLCP dimensions of 121 ft. x64 ft. by 8 ft. deep with 2H:1V side slopes (approximately 200,000 USG capacity plus 2-ft freeboard).

RESULTS

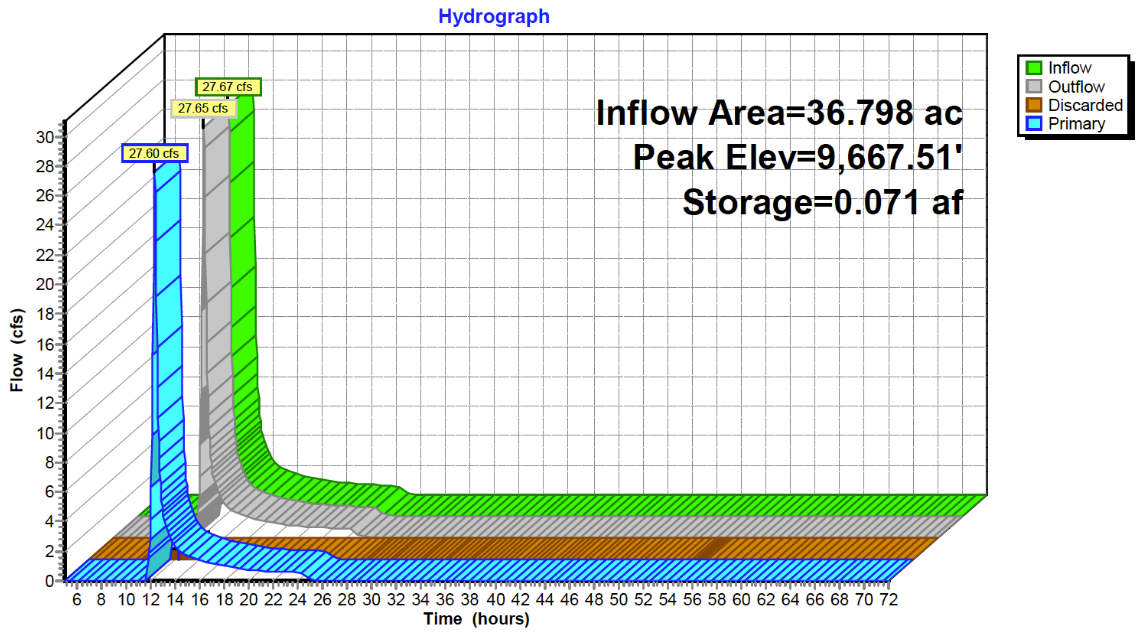
Modeling was completed using the HydroCad model with the above input parameters. Modeling run details and individual catchment hydrographs are provided in **Appendix 2-2.**

Outfall 1 Flow Summary

Stormwater flows into the sedimentation pond and is discharged over a broad-crested weir at a maximum flow rate of 27.60 cfs for a short duration and then continues for approximately 100 feet to Outfall 1 at the edge of the property. The flow rate then decreases rapidly to under 1.0 cfs within approximately 13 hours. A total of 2.266 ac-ft are discharged through Outfall No. 1for the storm. The hydrograph for the terminal sediment detention pond (Pond 5P - Outfall 1 exit and Subcatchment 8 collector) is provided for reference on **Figure 2-2**.

Surface water flows from the disturbed areas are isolated using run on and run off surface water control structures as needed. The disturbed areas will also be graded so that all surface flow contributions for designated facilities drain around the DTL and collect in the terminal sediment detention pond (5P) as shown on **Figure 2-4**. The LLCP, in addition to acting as an additional process water holding pond for operations, also serves as an emergency reservoir to safely and temporarily store any spillage that might occur from the milling process as it has been constructed with double synthetic liners with an integrated inter-liner leak detection and collection layer. The mill and processing facilities include specific components that are designed to handle such contingency events as summarized below. Details of these systems are also discussed in detail in Sections 3.4.5.

Figure 2-4: Outfall 1 Design Stormwater Hydrograph



- Mill building sump. Any excessive spillage will migrate via gravity on the sealed concrete floor to the sump located at the lowest point within the building. In the event of sump overflow, any spillage that exits the building will flow to the LLCP.
- Emergency containment sump. The existing DTL was originally designed and constructed as a conventional hydraulic containment structure for wet (slurry) flotation tailings. It is double-synthetic lined with leak detection between liners as approved under the original mill permit. The current amended design concept includes dewatering of the final flotation tailings stream to a dry filter cake which is placed via conveyor and spread with light earth-moving equipment as described in greater detail in Section 3.5. The original hydraulic impoundment design has been modified with a complete underdrain system that allows for its conversion to function as a dry tailings landfill, where both the dry tailings and any direct precipitation or snowmelt contact waters are completely isolated and have zero impact on the management of surface waters in the adjacent ground surfaces. Any contact water generated from precipitation, snowmelt, or seepage from the dry tailings filter cake that collects within the within the lined area of the DTL flow into the underdrain system and report to a collection sump where they are pumped into the LLCP.
- DTL Filter building sump and sediment trap. The DTL filter building will house a drum filter that will recover liquid from the slurry delivered via a slurry

pipeline from the mill. The filter building is constructed with a sealed concrete floor as primary containment and includes a sump and sediment trap. The sump feeds by gravity to the adjacent LLCP. Wash-down water and spillage within the Filter building runs to the sump prior to discharge into the LLCP. Filtrate (separated liquid) from the drum filter is pumped to a holding tank for settlement prior to gravity discharge into the LLCP. From the LLCP, filtrate as well as seepage and contact water collected from the DTL are pumped back into the plant for reuse. The LLCP functions as the overall emergency collection for all liquids being managed within the mill and the tailings dewatering (filtration) process, rendering the entire facility to operate continuously under "zero-discharge" conditions.

Pipes carrying tailings to the filter building and reclaim water back to the plant from the FTD Collection Pond will be double lined and buried where practical.

The disturbed area surface water control system design is included for reference as **Appendix 2-2**. Essential elements of this plan include:

- Runoff estimates that were generated using the criteria set forth by Urban Hydrology/or Small Watersheds, TR-55 by the USDA, NRCS, Conservation Engineering Division, dated June 1986. The Mill site 10yr-24hr storm is 1.58 inches (in) for the 24hr event. The 100yr storm event is 2.48in for the 24hr event;
- NRCS mapping and classification for the study area soil as a Leadville Sandy Loam, with 3% to 35% slopes. The soils are well drained and consist of stony and cobbly, medium-textured alluvium; and stony and medium cobbly, medium textured till. The soils are assigned a Hydrologic Group C rating. A Runoff Curve Number (RCN) of 0.035 was used for the undisturbed drainage channels;
- Channel areas are designed to carry the 100yr flows with at least a 0.5ft freeboard. Channels are designed with 3:1 or 2.5: 1 side slopes at specified depths. Channels within disturbed areas may be seeded and lined with fiber mats and staked, as necessary;
- Surface flows from all disturbed areas will be directed to the terminal sediment retention pond. Small sedimentation traps have been installed to contain runoff and potential sediment migration from the DTL embankment and report to the terminal pond. While revegetation is being established rock berms have been placed at the corners and South face of the DTL to control flows and sediment migration;

- Section 3 of the Drainage Report contains the design specifies that will be used to construct the disturbed area structures. The LLCP is constructed at the south end of the Mill building as shown on **Figure 3-1**.
- The undisturbed surface water drainage system will primarily be constructed to minimize runon to the disturbed area by using control channels or berms. Routed flows will be directed to undisturbed channels to minimize erosion while minimizing differences in original verses post-construction peak flows.

<u>Model conclusions for stormwater conditions applied in the model:</u>

1. The LCCP will retain direct precipitation from a 24-hour, 100-year event as well as collected underdrainage from the DTL.
2. In terms of sediment management, the peak flow that is expected under the 100-yr./24-hr. storm event scenario (refer to **Figure 2-1**, and **Appendix 2-2** - summary for Pond 5P), approximately 2.3 ac-ft of runoff is generated. The current management philosophy is to provide adequate pond depth (nominally 10 feet is being considered) and capacity (greater than 0.5 ac-ft) to maximize settling of any suspended solids and to reduce discharge velocities over the planned armored weir of the pond spillway to less than 3 fps. If these design measures are implemented, we believe that the potential for any offsite discharge at Outfall 1 of carried sediment is minimal. In addition, numerous upgradient control structures such as check dams, aggregate waddles, and other flow dissipation features in the contributing Subcatchments that are already in-place and functional will increase the effectiveness of the sediment detention pond functionality. Details of the sediment retention pond design will be completed prior to final permit approval.

GROUNDWATER CONTROL MEASURES

The containment design and surface-water control system discussed above effectively prevent spills from affecting the underlying groundwater. The proposed detection-level groundwater monitoring program provides a mechanism to validate this conclusion.

The proposed additional operating measures also prevent impacts to site existing hydrogeological and geochemical characteristics as follows:

- The operation complies with the commitments outlined in the approved CDPHE storm water permit (currently under review and approval) as detailed under Section U. This plan prevents any long-term surface ponding that would result in percolation to the water table.

- The proposed standard operating procedures (SOPs) emphasize the immediate detection and removal of potential spillage or leakage at de minimis volumes. These are also detailed in Exhibit U.
- Chemical releases will be reported, monitored and remediated as presented in Exhibit U.

The proposed detection level groundwater monitoring system includes the wells summarized in **Table 2-7** and shown on **Figure 3-1**.

TABLE 2-7: MONITORING WELLS

Well	Well Completion Depth (ft.)	Water Table Elevation (ft.)	Gradient Position
MA1TWM-4	64-89	9715	Up Gradient
PZ-2	77-95	9717	Cross Gradient
LM-MW-2	42-52	9651	Down Gradient
LM-MW-3	56-66	9684	Up Gradient

These wells will be monitored on a semi-annual basis using the sample collection and statistical analyses protocols included in the Groundwater Monitoring Plan and approves Sampling and Analysis Plan as provided in Section U. The plan was designed to detect changes in regional groundwater chemistry as well as detect the presence of compounds specific to the Mill that might be related to a site release.

2.5.2 AFFECTING SURFACE OR GROUNDWATER SYSTEMS

As detailed under Section 2.5.1, the planned operation will not affect surface or groundwater systems. No on-going water treatment exists or is anticipated as the mill process circuit is closed loop and zero discharge. The groundwater beneath the site is within an unnamed alluvial aquifer. Depth to groundwater exceeds 80 feet with the footprint of the mill site, and therefore no dewatering activities are anticipated for construction activities or during operations.

2.5.3 PROJECT WATER REQUIREMENTS

The project water requirement is based on metallurgical test work which in turn was used to develop the process flow sheet (See Section 3.2.1). This is discussed in Exhibit C, Process Facility Operating Plan. **Table 2-8** summarizes the water requirements

TABLE 2-8: PROCESS MATERIAL BALANCE

Flow Sheet Stream	Description	Solids %	Flow Rate (tph) Solids	Flow Rate (tph) Water	Slurry (gpm)
1	Crushed Ore	96.0%	9.26	0.39	-
2	Ball Mill Discharge	57.0%	23.15	17.46	104.6
3	Cyclone Feed	39.5%	23.15	35.50	175.9
4	Cyclone Underflow	50.0%	3.89	13.89	76.5
7	Cylcone Overflow	30.0%	9.26	21.61	100.7
28	Process Water to Gravity	-	-	27.78	-
6	Gravity Concentrate	90.0%	0.14	0.02	0.3
5	Gravity Tailing	33.1%	13.75	27.76	132.7
26	Process Water to Mill	-	-	10.69	44.9
27	Water to Sump	-	-	8.04	75.7
8	Thickener Underflow	35.0%	9.26	17.20	82.9
19	Thickener Overflow	-	-	0.84	3.5
9	Rougher Flotation Concentrate	15.0%	1.85	10.48	44.9
10	Rougher Flotation Tailing	44.2%	7.41	9.34	49.0
12	Cleaner 1 Concentrate	15.0%	0.37	2.10	9.0
11	Cleaner 1 Tailing	14.2%	1.48	8.88	38.7
13	Cleaner 2 Concentrate	15.0%	0.09	0.51	2.2
14	Cleaner 2 Tailing	15.0%	0.28	1.59	6.8
20	Combined Tailing	32.8%	8.89	18.22	85.8
21	Tailing Thickener Underflow	60.0%	8.89	5.92	36.5
23	Filtered Tailing	80.0%	8.89	2.22	22.1
22	Thickener Overflow	-	-	12.30	51.6
24	Filtrate	-	-	3.70	15.5
25	Concentrate Thickener Feed	30.3%	0.23	0.53	2.5
15	Concentrate Thickener U/F	60.0%	0.23	0.13	1.0
16	Concentrate Thickener O/F	-	-	0.40	1.7
17	Final Concentrate	80.0%	0.23	0.06	0.6
18	Concentrate Filtrate	-	-	0.07	0.3

Water requirements are a function of process plant operating rate. **Table 2-9** below shows water requirements at the maximum plant capacity of 200 tons per day.

Development and reclamation water requirements are de minimis.

TABLE 2-9: WATER REQUIREMENT

Consumption Rate	Tons Water	Gallons Water	Acre-ft
Hourly (unit/hr)	2.2	470	0.002
Daily (unit/day @ 24-hr/day)	52	20,160	0.043
Monthly (unit/mo. @30.42day/mo.)	1,570	375,000	1.30
Annual (unit/yr. @ 365-day/yr.)	18,835	4,520,000	15.6

The approximate maximum volume of water flowing to the closed sumps discussed in Section 3.2.1 is 114 gpm. The LLCP volume, excluding freeboard, is approximately 200,000 USG under the proposed sizing and design.

Based on the anticipated consumptive use of water in the process, the facility will operate under a significant deficit and therefore all direct collected precipitation and snowmelt could be consumed or could be re-applied in the DTL.

2.5.4 PROJECT WATER SOURCES

CJK is developing 3 sourcing options for water supply:

- On-site water well;
- Leadville Sanitation;
- Parkville Water District, industrial user purchase

CJK will provide the sources and volumes of water prior to beginning plant operation.

2.5.5 NPDES PERMIT

As the planned facility has been demonstrated to be a “zero-discharge” operation in terms of process pollutant discharge, it will be exempt from the requirement to obtain a National Pollutant Discharge Elimination System (NPDES) permit from the Water Quality Control Division at the Colorado Department of Health and Environment

2.5.6 GROUNDWATER POINT OF COMPLIANCE

Groundwater monitoring is discussed in general terms in Section 2.5.2 above and in greater detail in the Groundwater and Surface Water (within 2 miles of the facility) Monitoring Plans (Section U). The Mill site groundwater flows generally from the northeast to the southwest. This flow direction establishes wells MA1TWM-4 and LM-MW-3 as up-gradient wells, PZ-2 as a cross-gradient well and LM-MW-2 as the down-gradient well, making it the point of compliance.

APPENDIX 2-1

SOILS ANALYSIS

ACZ LABORATORIES

This is a 26-page document

APPENDIX 2-2

LEADVILLE HYDROCAD REPORT

27 pages

3.0 RULE 6.3.3: EXHIBIT C–PROCESS FACILITY OPERATING PLAN

3.1 DESIGN CRITERIA

Design criteria used to develop the flowsheet, operating parameters, and equipment sizes are based on metallurgical test work and engineering designs. Key design criteria are summarized in **Table 3-1**.

TABLE 3-1: MILL DESIGN CRITERIA

No.	Parameter	Value	Unit
1	Plant Capacity	200	tpd
2	Plant Availability	90%	-
3	Operating Hours	24	hr/day
4	Feed Rate	9.26	tph
5	Ball Mill Feed, F80	12,500	micron
6	Ball Mill Product, P80	104	micron
7	BWi	15.45	kWh/t
8	Ball Mill Discharge	65%	solids
9	Cyclone Feed	50%	solids
10	Circulating Load	250%	-
11	Cyclone O/F	30%	solids
12	Cyclone U/F	50%	solids
13	Thickener U/F	35%	solids
14	Flotation Feed	35%	solids
15	Rougher Flotation Residence	22.5	minutes
16	Rougher Concentrate	15%	solids
	Mass Pull	**6%**	
17	Rougher Tailings	44.2%	solids
18	Cleaner Flotation 1	15	minutes
19	Cleaner Flotation 2	15	minutes
20	Concentrate Thickener		
	Settling Rate	11	ft2/tpd
	Feed	15%	solids
	Thickener U/F	50%	solids
21	Concentrate Filter		
	Filtration Rate Rate	100	lbs/hr/ft2
	Area Required	8	ft2
22	Tailings Thickener	8	ft-diameter
23	Tailings Filter	40	ft2

3.1.1 AREA 100 CRUSHING CIRCUIT

The crushing circuit design is based on the ability of the crusher to:

- Produce a consistent P_{80} -18mm (≈11/16”) product for the ball mill, as shown in **Table 3-2**. Testing shows that this can be accomplished with a single short-head cone crusher. However, the flowsheet provisions the future addition of a primary jaw crusher preceding the cone crusher.

TABLE 3-2: CRUSHER PERFORMANCE CRITERIA

Equipment Performance	Value	Unit
Primary Crusher		
Feed	57	stph
F_{80}	50	mm
P_{80}	18	mm
Screen Aperture	18	mm

- Operate only during day shift.
- Control dust emissions.
- Operate below county noise limit of 75dBA.
- Maintain low seismicity

3.1.2 AREA 200 GRINDING CIRCUIT

The grinding circuit design is based the ball mill’s ability to produce 200tpd of P_{80} 104 (140mesh) material for leaching. Metallurgical test work has determined that the existing Marcy No. 54 (5’-diameter by 4’ length) will meet this criterion.

Grinding circuit equipment performance criteria are shown in **Table 3-3**.

TABLE 3-3: GRINDING & GRAVITY PERFORMANCE CRITERIA

Equipment Performance	Value	Unit
Fine MDM Bin Capacity	250	st
Ball Mill		
F_{80}	12,500	micron
P_{80}	104	micron
BWI	15.45	-
Operating Hours	20	hr/day
Horsepower	40	hp
Horsepower Max	50	hp
Ball Mill Sump		
Flowrate	600	gpm
Residue Time	4	min
Sump Capacity (@90% capacity)	2,670	gal

Cyclone		
Operating Units	1	units
Standby Units	1	units
Flowrate, total	300	gpm
Flowrate, per unit	300	gpm
Gravity Concentrator		
Feed	30%	solids
Capacity	18	tph
MDM Thickener		
Feed	30%	Solids
Dimension	11ftD x 8ftH	-
Volume	760	ft^3

3.1.3 AREA 300 FLOTATION, THICKENING & FILTRATION

Flotation & gravity performance is determined by metallurgical testing which included determining optimum grind size (for ball mill sizing and retention time, as well as flotation retention time.

Tailings are filtered to reduce water content to approximately 25% by weight prior to stacking in FTL facility. Filtered tailings are deposited at a rate of 9.0tph, using conventional filter technology and flocculants to minimize tailings moisture content.

Flotation performance criteria determined in metallurgic testing are shown in **Table 3-4**.

TABLE 3-4: FLOTATION PERFORMANCE CRITERIA

Area	Value	Units
Rougher Flotation Cells		
Feed	35	% solids
No. of tanks	3	units
Tank Dimension (each)	7ftD x 9ftH	-
Total Volume	1,039	ft^3
Cleaner Flotation Cells		
Feed	15	% solids
No. of tanks	4	units
Tank Dimension (each)	3.5ftD x 9ftH	-
Total Volume	346	ft^3
Concentrate Thickener		
Feed	15%	solids
Dimension	3ftD x 7ftH	-
Volume	1132	ft3
Concentrate Filter		
Feed	60%	solid
Settling Rate	11	ft^2/tpd
Filtration Rate	100	lb/ft^2-hr
Area Required	12	ft^2

Tailings Thickener		
Feed	44%	Solids
Dimension	8ftD x 7ftH	-
Volume	352	ft^3
Tailings Filter		
Feed	60%	solid
Settling Rate	11	ft^2/tpd
Filtration Rate	100	lb/ft^2-hr
Area Required	40	ft^2

3.1.4 AREA 700 UTILITIES

The Mill is an existing facility constructed circa 1990, and improvements were made during 2009-2012 as well as 2021-2022. Requisite utilities and services are in place and functional.

Electrical & Instrumentation.

- Switchgear is in place within the mill building and is suitable for equipment.
- A new transformer was installed in 2022.
- The Crusher Building (Area 100), and Mill Building containing the Grinding & Gravity (Area 200), and Flotation (Area 300) will be connected to the existing power supply by licensed electrical contractors.
- Instrumentation. The process facility is operated by manual observation and control of process through installed sensors and instruments. There is no Programmable Logic Controller (PLC) system.

Water & Sanitation.

- Process and potable water is provided by Parkville Water District via a connection to the Leadville Sanitation water line. Potable water is stored in separate, stand-alone stainless steel tanks.
- Employees and guests have accessed to hot and cold bottled drinking water.
- Fire water is provided by a hydrant from the process water line.
- The facility is connected to the Leadville Sanitation sewer line, which runs through the property.

Communication.

- Communication is via wireless service providers.

Mobile Equipment.

- Skid Steer

- ¾-ton 4x4 pickup

3.1.5 AREA 800 REAGENTS

Reagent Handling.

- Manually load bulk reagents into hoppers or mix tanks to make reagent solution.
- Pump reagent solutions to reaction vessels.

Reagent Management.

Reagent Requirement is discussed in **Section 3.3.6**.

3.2 MILL SITE & PROCESS PLANT OVERVIEW

The plant has been designed to operate at a nominal rate of 9.3tph ore throughput using 3 8-hr shifts per day for a 20-shift cycle, with the 21st shift reserved for maintenance. Annual production will be a nominal 70,000 tons, operating 350 days per year. It is estimated that the plant will be down 15 days per year for maintenance, and unplanned events.

The process is described as conventional flotation and gravity concentration to produce a gold-silver concentrate which will be shipped to a smelter/refining facility. Tailings from the operation will be filter and disposed in the **Filtered Tailings Landfill (FTL)**.

The plant is designed to be zero discharge, and is protected by the freeboard in the (already constructed) FTL.

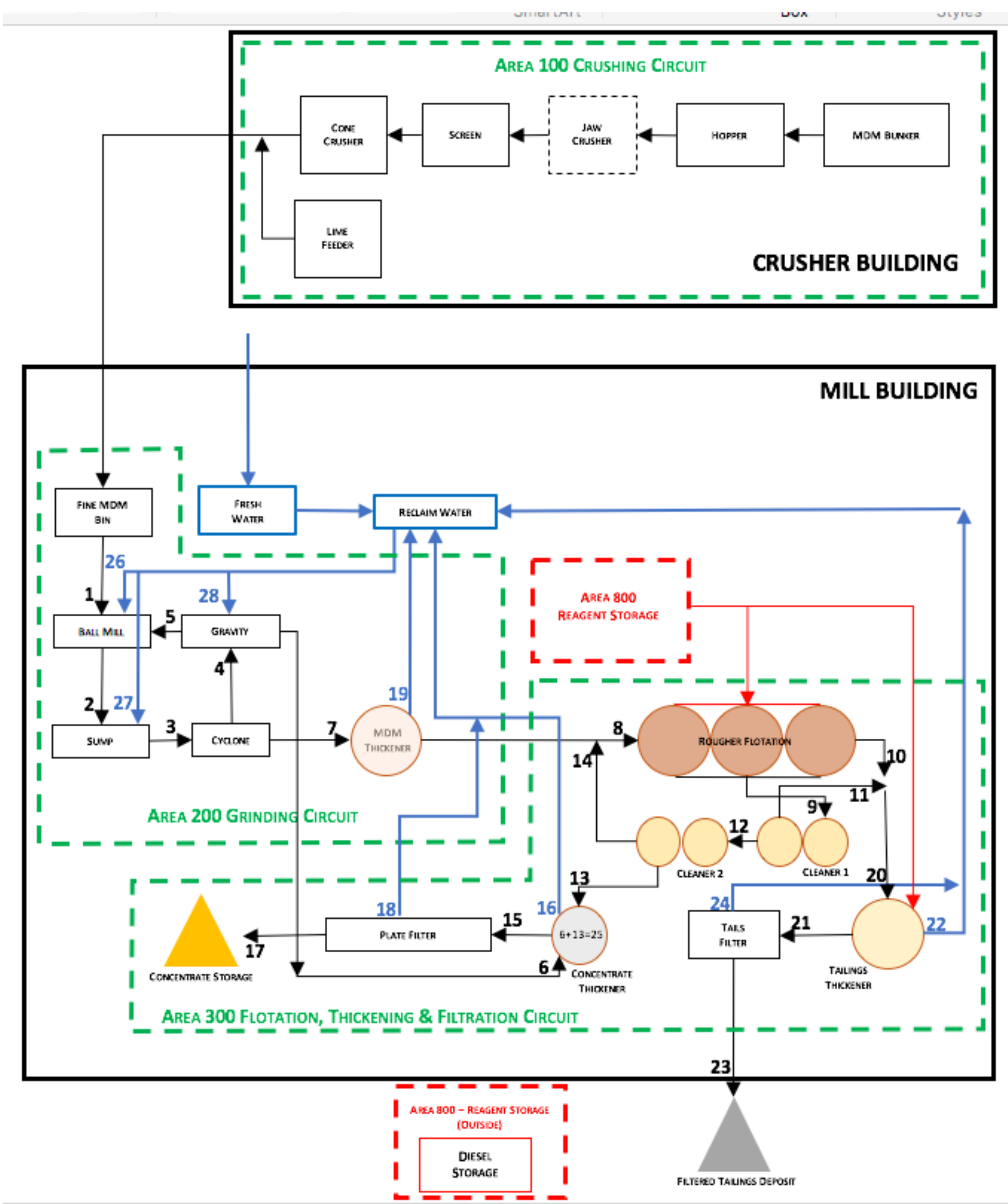
This permit amendment application considers the processing of approximately 500,000 tons of historic **Mine Dump Material (MDM)** from the historic Penn Group Mines. The plant general arrangement is shown in **Figure 3-1**.

Figure 3-1: Mill Site General Arrangement

3.2.1 -PROCESS FLOWSHEET, MATERIAL BALANCE & PLANT CAPACITIES

The metallurgical process uses time-tested gravity and bulk flotation to make a gold-silver concentrate that will be shipped to a 3rd-party smelter/refinery. A simplified process flowsheet is shown below. The process detailed in **Section 3.3**.

SIMPLIFIED PROCESS FLOWSHEET



MATERIAL BALANCE

Table 3-5 shows the process material balance with corresponding process streams depicted in a simplified process flowsheet.

TABLE 3-5: PROCESS MATERIAL BALANCE

Flow Sheet Stream	Description	Solids %	Flow Rate (tph) Solids	Flow Rate (tph) Water	Slurry (gpm)
1	Crushed Ore	96.0%	9.26	0.39	-
2	Ball Mill Discharge	57.0%	23.15	17.46	104.6
3	Cyclone Feed	39.5%	23.15	35.50	175.9
4	Cyclone Underflow	50.0%	3.89	13.89	76.5
7	Cylcone Overflow	30.0%	9.26	21.61	100.7
28	Process Water to Gravity	-	-	27.78	-
6	Gravity Concentrate	90.0%	0.14	0.02	0.3
5	Gravity Tailing	33.1%	13.75	27.76	132.7
26	Process Water to Mill	-	-	10.69	44.9
27	Water to Sump	-	-	8.04	75.7
8	Thickener Underflow	35.0%	9.26	17.20	82.9
19	Thickener Overflow	-	-	0.84	3.5
9	Rougher Flotation Concentrate	15.0%	1.85	10.48	44.9
10	Rougher Flotation Tailing	44.2%	7.41	9.34	49.0
12	Cleaner 1 Concentrate	15.0%	0.37	2.10	9.0
11	Cleaner 1 Tailing	14.2%	1.48	8.88	38.7
13	Cleaner 2 Concentrate	15.0%	0.09	0.51	2.2
14	Cleaner 2 Tailing	15.0%	0.28	1.59	6.8
20	Combined Tailing	32.8%	8.89	18.22	85.8
21	Tailing Thickener Underflow	60.0%	8.89	5.92	36.5
23	Filtered Tailing	80.0%	8.89	2.22	22.1
22	Thickener Overflow	-	-	12.30	51.6
24	Filtrate	-	-	3.70	15.5
25	Concentrate Thickener Feed	30.3%	0.23	0.53	2.5
15	Concentrate Thickener U/F	60.0%	0.23	0.13	1.0
16	Concentrate Thickener O/F	-	-	0.40	1.7
17	Final Concentrate	80.0%	0.23	0.06	0.6
18	Concentrate Filtrate	-	-	0.07	0.3

PLANT MATERIAL CAPACITIES

Plant material capacities, including reagents are shown in **Table 3-6**. A detailed discussion of plant operations is provided in **Section 3.3**.

TABLE 3-6: PLANT MATERIAL CAPACITIES

Mech Equip No	Flow Sheet Ref	Process Equipment	Solid: Soln Ratio	% solids	Total Volume (ft3)	Ton Solids	Ton Water	Gal Water	Lime (lbs)	AP 3418A (lbs)	AP 404 (lbs)	AF 65 (lbs)	Percol 351 (lbs)
1	1	MDM Bin	2.70	96%	2,968	240	10	2,397	1,920	0	0	0	0
1	1-2	Ball Mill	0.31	77%	31	0.2	1	180	2	0	0	0	0
2	3-4-7	Cyclone	1.51	40%	-	-	-	-	-	-	-	-	-
3	4-5	Gravity Concentrator	1.41	42%	-	-	-	-	-	-	-	-	-
4	7-8	Feed Thickener Tank	2.08	33%	760	16	8	1,847	128	0	0	0	0
5	8	Conditioner Tank	1.86	35%	75	2	1	197	12	0.16	0.16	0.07	0.05
6	8-10	Rougher Flotation Tanks	1.51	40%	1,039	19	13	3,096	156	2.09	2.09	0.83	0.63
7	9-13-14	Cleaner Flotation Tanks	5.67	15%	346	9	2	388	73	0.98	0.98	0.39	0.29
8	13-15	Concentrate Thickener	1.67	38%	113	2	1	317	18	0.24	0.24	0.09	0.07
9	15-17	Concentrate Filter	0.43	70%	12	0	0	65	1	0.01	0.01	0.00	0.00
10	20-21	Tailings Thickener Tank	1.16	46%	352	6	5	1,221	47	0.63	0.63	0.25	0.19
11	21-23	Tailings Filter	0.43	70%	372	3	8	1,947	28	0.37	0.37	0.15	0.11
12	15-17	Concentrate Filter	0.43	70%	37	0	1	194	3	0.04	0.04	0.01	0.01
13	26-28	Reclaim Water Tank	-	0%	545	0	17	4,075	0	0.00	0.00	0.00	0.00
14	-	Fresh Water Tanks	-	0%	1,378	0	43	10,303	0	0.00	0.00	0.00	0.00
		TOTAL			**8,029**	**298**	**109**	**26,227**	**2,388**	**4.52**	**4.52**	**1.81**	**1.36**

Process water consumption is shown in **Table 3-7**. Approximately 110-tons of water is in the system during steady state operation. About 27,000-gallons per hour of water is circulating at any given time, of which about 2-tons per hour reports to tailings, and so is made up with fresh water.

Make-up is purchased from Parkville water and delivered via pipeline.

TABLE 3-7: PROCESS WATER REQUIREMENT

Process Water	Water (tph)	Slurry (gpm)
Tank Inflow	27.16	114.0
Water Required	24.98	94.3
Make-Up Water	**2.18**	**19.7**

Reagent consumption is discussed in **Section 3.3.5**.

3.3 PLANT OPERATION

Plant operations are as follows.

3.3.1 AREA 000 RECEIVING MINE DUMP MATERIAL (MDM)

Battery Limits: Haul road at AVS-Mill property boundary to dumping at the **MDM Bunker**.

Equipment: Hauling operations have been identified as an area of concern by Lake County, and will be addressed during the **CUP** process. As such, CJK is considering the use of 2 haul truck types.

Remediation material will be delivered using either 18-ton tandem dump trucks or 21-ton semi tractor-trailer trucks. Initially, the plant will be constructed to accommodate tandem trucks. The process can be easily modified to accommodate semi tractor-trailers, as described below.

Nominally, there will be about 10 to 15 truck trips per day, assuming the planned 7-day per week operation. It is anticipated that hauling will only be allowed during daylight hours.

Reagents: Water will be used for dust suppression on the haul road. Consumption is weather dependent and it is anticipated will vary from approximately 0 to 500 gallons per day (gpd).

Operation: The haul road is approximately 4,100ft in length, and 25ft wide. Curves have a radius to accommodate semi-tractor trailer trucks, and are of sufficient width to allow trucks to pass at a slow speed. Approximately 2,500ft of the road is on the AVS Project property and 1,600ft on the Mill property. The scale is located on the AVS Property and is shared with the CJK Aggregates facility.

- Haul trucks enter the Mill via the AVS Slag Project entrance and road off of **US Highway 24 (US-24)**. This entrance is located at the intersection of US-24 and County Road 23A. Then,
- Travel approximately 900ft to weigh-in at scales at AVS property. The scale may be covered for protection from the weather. The truck is identified by a unique transponder and the information is electronically recorded on the Mill data logger. Then,
- Travel approximately 3,200ft to unload into the MDM Bunker. There is a staging (wide) area on the road, just north of the Mill building where trucks can wait if a truck is unloading. Then,
- Trucks will back into MDM Bunker to unload. Then,

- Trucks will exit the MDM Bunker area via a short road connecting to the main haul road that is located in front of the staging area. Then,
- The truck transponder also transmits the tare weight to determine the net weight of delivered material.

  Engineering

- The haul road will be an extension of the AVS haul road. When approved, this activity will require clearing trees, grading in the road, and placing an aggregate surface. No engineering is required.

3.3.2 AREA 100 CRUSHING CIRCUIT

PLANNED OPERATION

Battery Limits: MDM Bunker to the **Fine Ore MDM Bin (MDM Bin)**.

Equipment: Equipment and infrastructure associated with the crushing circuit is shown in **Table 3-8**.

TABLE 3-8: CRUSHER CIRCUIT EQUIPMENT

Equipment Number	Flow Sheet	Equipment Description	Size
-	-	Crusher Metal Building	30' x 84'
-	-	Crusher Bunker	800t
100-BN-001	1	Feed Hopper	2t
100-FD-004	1	Belt Feeder w/ VFD Drive	3'x5'
100-MG-001	1	Tramp Metal Magnet	-
100-SC-000	1	Triple Deck Screen	4'x10'
100-SC- 001	1	Single Deck Screen	3'x5'
100-CV-009	1	Screen Under- size conveyor	18"x5'
100-CV-010	2	MDM Bin Feed conveyor	18"x120'
100-CR-002	1	Short-Head Cone Crusher	22"
100-CV-004	1	Screen Over-size Conveyor to Cone	18" x 16'
	1	Cone Discharge Conveyor	18" x 6'
100-CV-005	1	Cone Transverse Conveyor # 1	18" x 6'
	1	Cone Transverse Conveyor # 2	18" x 22'
100-CV-007	1	Cone Transverse Conveyor # 3- to Screen	18" x 8'
700-BN-001	1	Lime Feed Hopper / Bag Breaker	-
700-SF-001	1	Lime Screw Feeder - VFD	7stph
-	-	Front-End Loader	2yd^3
-	-	Bag House & Ventilation Ducting	-

Operation: Reference the following.

- ❖ **Figure 3-2**, Crusher Circuit PFD,
- ❖ **Figures 3-3A, 3-3B** Crusher Building General Arrangement, and
- ❖ **Figure 3-4 S1 to 3-4 S7** Crusher Building Engineering Drawings.

The Operation is described as follows:

Crushing Circuit PFD (Figure 3-2)

- The MDM Bunker is a 3-compartment concrete structure with a total capacity of 200-tons. Water sprays will be available and will operate as required to control dust.
- A 2yd^3 loader reclaims material from the bunker and feeds it into a 2-ton crusher feed hopper. Maximum loader feed rate as required by the process is 30 tons per hour.
- The feed hopper is located in front of a 30' x 84' crushing and screening building. The building is insulated to retain heat and noise, and properly rated for snow loads.
- A tramp iron magnet captures iron from the crusher feed conveyor. Periodically, iron is removed from the magnet, and placed in a barrel. Tramp iron is recycled at local (or regional) recycler.
- Material is crushed in a 22-inch short-head cone crusher. Nominal required crushing capacity is 57 tons per hour.
- Material is screened to specification. Spec material is conveyed to the MDM Bin, and oversize material – about 20% of feed is recirculated back to the crusher.
- A lime feeder applies lime onto the crushed material at a rate of 8lb-$Ca(OH)_2$/t-material as it is conveyed to the MDM Bin Conveyor.
- Dust collectors capture dust at all transfer points.
- The circuit has a provision for adding a jaw crusher to the process facility. A technical Revision to the permit application will be presented to CDRMS if this is required.

Crushing Bldg. Engineering (Figures 3.3A-3.3B and Figures 3.4(S1) to 3.4(S2)

- The crushing building and MDM receiving concrete bunkers are constructed as designed by Kerrigan engineers.
- The concrete bunkers are covered to mitigate noise and dust.
- The building is a steel structure 27ft x 84ft and placed on an ICF foundation. It houses the cone crusher, lime system and plant-wide dust collector. Also, the inside is insulated for sound.
- A 18in x 120ft conveyor transfers MDM from the crusher building to the MDM bin inside the Mill Building.

ALTERNATIVE OPTION

Battery Limits: An alternative option would use the existing crusher facility. Existing **Grizzly to the Fine Ore MDM Bin (MDM Bin)**.

Equipment: **Table 3-9** shows all the equipment currently in place in the existing crusher building. Existing and new equipment that will used, as described below is shown in bold text. Existing equipment that will not be used will be removed from the building and sold.

TABLE 3-9: CRUSHER CIRCUIT EQUIPMENT(EXISTING)

Equipment Number	Flow Sheet	Equipment Description	Size
-	-	**Grizzly (Existing)**	**8”**
-	-	**Crushed MDM Bin (Existing)**	**50t**
-	-	Screen (removed)	3/4-inch
-	-	Jaw Crusher (removed)	14-inch
-	-	Roll Crusher (removed)	12-incu
-	-	Conveyor (removed)	10-ft
-	-	Bucket Conveyor (removed)	25-ft
	-	**Ore Feeder (New)**	**2t**
	-	**Cleat Conveyor (New)**	**12in x 20ft**
-	-	**Tramp Metal Magnet (New)**	**-**
-	-	**Conveyor to MDM Bin (Existing)**	**12in x 35-ft**
-	-	**Dust Collection Ductwork**	**-**

Reagents: No reagents are added in the alternative crushing option. In this instance, MDM would be crushed, and lime added as required, at the Penn Mine and then transported to the Mill. This will require a Technical Revision (subject to approval) to the Penn Mine Reclamation permit.

Operation: The alternative crushing option will use the existing crushing circuit to transfer MDM material – that was crushed at the Penn Mine – to the **MDM Bin**.

- Trucks will deliver crushed MDM and dump the material through a grizzly with 8” spacing into the 50t Crushed MDM Bin.
- Material greater that 8-in will be removed from the grizzly and manually crushed the material with a sledge hammer. The crusher and power screen at the Penn mine is designed to crush ore to minus 1/2-inch. It is not anticipated that +8-in MDM will arrive at the mill.
- MDM will flow through the crushed MDM Bin at a rate of 20tph to the conveyor to the (new) ore feeder and onto a cleat conveyor and onto the conveyor to the MDM bin.

  - A tramp iron magnet will capture iron on this conveyor. Periodically, iron is removed from the magnet, and placed in a barrel. Tramp iron is manually recovered and recycled at local (or regional) recycler(s).
- Dust collectors will capture dust at all transfer points.

Engineering

- The existing crusher building is in place and does not require construction.
- The existing screen, jaw and roll crushers, bucket elevator feed conveyor and buck elevator will be removed and sold.
- A new conveyor feed chute and cleat conveyor will take the place of the removed equipment and will feed the historic bucket elevator to MDM conveyor. This conveyor was removed, but will be reinstalled.

Figure 3-2: Flowsheet 01_Crushing Circuit

Fig03-03(A)_CrusherPFDPlan

Figure 3-3A: Crusher PFD Plan

Fig03-03(B)_CrusherPFDElevation

Fig03-04(S1)_CrusherFacilityFoundationGA

Figure 3-4(S1): Crusher Facility Foundation GA

Fig03-04(S2)_CrusherBuildingFoundationPlanDetails

Fig03-04(S3)_CrusherBuildingFoundationDetails

Fig03-04(S4)_MDMStorageFoundationPlan

Fig03-04(S5)_MDMStorageFoundationDetails

Fig03-04(S6)_MDMStorageElevation

Fig03-04(S7)_MDMStorageRoofFramingPlan

3.3.3 AREA 200 GRINDING CIRCUIT

Battery Limits: MDM Bin to **MDM Thickener**.

Equipment: Equipment required for grinding is shown in **Table 3-10**.

TABLE 3-10: GRINDING CIRCUIT EQUIPMENT

Equipment Number	Flow Sheet	Equipment Description	Size
200-BN-002	2	MDM Bin	250st
200-FD-002	2	Belt Feeder w/ VFD Drive	3'x5'
200-BS-002	2	Belt Scale - See Instrumentation	-
-	2	Ball Mill Feed Chute	-
200-SC-002	2	Ball Mill Discharge Trommel	-
200-TK-002	2	Ball Mill Sump	30ft^3
200-PP-002	2	Cyclone Feed Pump (Slurry) VFD	20gpm
-	-	Gravity Concentrator	12-in
200-CY-001-003	2	Cyclone Cluster	6"
-	2	Cyclone Tower	-
200-TK-002	2	Pre-Leach Thickener	14'
200-TK-001	2	Thickener Feed Tank	-
200-TK-004	2	Thickener Overflow Tank	-
200-PP-004	2	Overflow Tank Pump	250gpm
200-PP-006	2	Underflow pump (feed to leach)	250gpm
-	-	Overhead Hoist	10st

Operation: Reference the following:

- **Figure 3-5** Grinding Circuit PFD, and
- **Figure 3-6A&B** Mill Building General Arrangement and Elevation.

The operation is described as follows.

Grinding Circuit PFD (Figure 3-5)

The Grinding Circuit is located inside the Mill Building.

- Material is received from the Crusher Building at a rate of up to 57tph, plus lime at up to 456lb/hr. Lime is applied to increase pH in the MDM.
- Material from the MDM Bin is fed onto a Variable Feed Drive (VFD) belt feeder at a nominal rate of up to 9.26tph. Maximum feed can be up to 20tph.
    - The maximum capacity of the MDM Bin is 250t (wet). Operating capacity will vary from 0 tons to 250t.
- Process plant production rate is manually controlled by the plant operator by adjusting the VFD as material passes over the belt scale, which is installed on the ball mill feed conveyor belt. There is a balance of ball mill feed from the

MDM Bin and the recirculating load from the cyclone. This is manually balanced by the VFD.

- Material enters the ball mill at a rate of 9.26tph solids and 0.39tph water. Process water is added at 10.69tph (44.9gpm) to achieve 57% solids for optimal grinding.
  - Water is sourced from the reclaim water tank.
  - The recirculating load in the ball mill is approximately 250%.
- Ball Mill discharge is at 23.15tph solids and 17.46tph water at a rate of 104.6gpm through a trash trommel.
  - The trommel primarily separates used grinding balls from the ground material.
  - Grinding ball consumption is approximately 0.2lb grinding balls per 1 ton-material. Grinding balls are manually fed into the ball mill from the feed area.
- Material passes through the trommel into the ball mill sump.
  - Process water is added in the sump at 8.04tph (75.7gpm)
  - The volume of the sump is 51ft^3 and holds approximately 1.5 ball mill volume.
- The cyclone feed pump takes material from the ball mill sump at 23.15tph solids and 35.5tph water at a rate of 175.9gpm through a cyclone classifier.
- Any water that may spill within the facility will report to the sump which is then reclaimed into the reclaim water tanks.

Gravity Concentrator

- Prior to reaching the cyclone, stream from this cyclone feed pump at 0.14tph solids and 0.02tph water at a rate of 0.3gpm goes through the Knelson concentrator. Water is added to the gravity concentrator at 27.78tph. This is a gravity separator the recovers gold concentrate, and does not use reagents. Gold concentrate – process underflow - is manually recovered approximately once every 5 to 10 hours as required. This material is collected in a 5-gallon bucket. Gravity concentrate is 90% solids.
- Process overflow from the gravity concentrator reports directly to the ball mill at 13.75tph solid and 27.76tph water at a rate of 132.7gpm. It does not go through the cyclone.

- Cyclone underflow is recirculated back into the ball mill at 9.26tph solids and 21.61tph water at a rate of 100.7gpm.
- Cyclone overflow reports to the MDM Thickener at 3.89tph solids and 13.89tph water at a rate pf 76.5gpm, where slurry is thickened to 30% solids, as required for the leach circuit.
- Any water that may spill within the facility will report to the sump which is then reclaimed into the reclaim water tanks.

Engineering (Figure 3-5)

- The grinding circuit is essentially in place and does not require construction.
- The MDM bin, ball mill (and sump), and MDM thickener are already in place.
- The cyclone stand and is also in place but may need to be slightly re-positioned to accommodate placement of the gravity concentrator. These are small units and are easily installed.

Fig03-05_Flowsheet002_Grinding Circuit

Figure 3-5: Flowsheet 002_Grinding Circuit

Fig03-6A_MillBuildingGAPlan

Figure 3-6A: Mill Building GA Plan

Fig03-6B_MillBuildingGAElevation

3.3.4 AREA 300 FLOTATION, THICKENING & FILTRATION

Battery Limits: **MDM Thickener** to;

- **Tailings Thickener, Filter & FTL, and**
- **Concentrate Thickener, Filter, & Bagging & Storage**

Equipment: Equipment required for the agitated leach circuit is shown in **Table 3-11**

TABLE 3-11: FLOTATION, THICKENING & FILTRATION CIRCUIT EQUIPMENT

Equipment Number	Flow Sheet	Equipment Description	Size
200-FD-002	2	Ball Mill Feeder	12-inch
200-BS-002	2	Belt Scale	-
200-CH-001	2	Feed Chute	-
200-BW-001	2	Ball Mill	5ft x 4ft
200-TB-001	2	Trommel Trash Bin	-
200-TK-002	2	Ball Mill Sump	-
200-PP-001	2	Cyclone Feed Pump	-
200-CY-01,02	2	Cyclone	4-inch
200-HO-002	2	Cyclone Maintenance Hoist	1-ton
-	2	Gravity Concentrator	12-inch
200-TK-002	2	MDM Thickener	352ft3
200-TK-004	2	Overflow Tank	100gal
200-PP-004	2	Overflow Pump	-
200-PP-008	2	Underflow Pump	-
200-TK-xxx	2	Feed Tanks	50gal
200-SP-001	2	Floor Sump & Pump	500gal
300-AG-000	3	Rougher Flotation Conditioning Agitator	-
300-TK-100	3	Rougher Flotation Conditioning Tanks	100gal
300-FL-01-03	3	Rougher flotation Bank	346ft3
300-TK-000	3	Rougher Froth Sump	50gal
300-PP-000	3	Rougher froth Pump	-
400-FL-000	4	1ST Cleaner Flotation Bank	45ft3
400-FL-000	4	2nd Cleaner Flotation Bank	45ft3
400-TK-000	4	1st Cleaner Froth Sump	50gal
400-PP-000	4	1st Cleaner Froth Pump	-
400-TK-000	4	2nd Cleaner Concentrate Sump	50gal
400-PP-000	4	2nd Cleaner Concentrate Pump	-
400-TK-000	4	1st Cleaner Tailings Sump	50gal
400-PP-000	4	1st Cleaner Tailings Pump	-
400-SA-000	4	Metallurgical Sampler	-
400-TH-000	4	Concentrate Thickener	113ft3
400SU-000	4	Concentrate Thickener O/F Sump	50gal
400-PP-000	4	Concentrate Thickener O'F Pump	-
400-PP-000	4	Thickener U/F Pump	-
400-FP-000	4	Concentrate Filter Press (Existing)	8ft2
500-TH-000	4	Tailings Thickener	352ft3
500S-U-000	5	Tailings Thickener O/F Sump	50gal
500-PP-000	5	Tailings Thickener O/F Pump	-
500-DF-000	5	Tailings Drum	100ft2
500-CV-000	5	Conveyor to FTL	12-in

Operation: Reference the following:

- **Figures 3-6A & 3-6B**, Mill Building GA and Elevation
- **Figure 3-7**, Rougher Flotation PFD,
- **Figure 3-8**, Cleaner Flotation, Thickening and Filtration PFD,
- **Figure 3-9**, Tailings Thickener and Filtration PFD, and
- **Figure 3-10**, Tailings Thickener and Filtration Building GA.

The operation is described as follows:

MDM Thickener & Conditioner (Figure 3-5)

The MDM Thickener has a capacity of 760ft^3.

- Underflow from the MDM Thickener flows at 9.26tph solids and 17.2tph water in a slurry running at 82.9gpm to the rougher flotation conditioning tank.
- MDM Thickener overflow (water) is reclaimed to the mill building sump at a rate of 0.84tph at 3.5gpm then pumped to the process water tank.

The Conditioning Tank has a capacity of 118ft^3.

  - Promoters and frothers are added in the conditioning tank.

- The conditioned slurry then flows at 9.26tph solids and 17.2tph water in a slurry running at 82.9gpm to the rougher flotation cells.

Rougher Flotation (Figure 3-7)

There are 3 rougher cells, each with a capacity 346ft^3, totaling 1,38ft^3. The cells operate in series.

- Rougher concentrate then flows at 1.85tph solids and 10.48tph water in a slurry running at 44.9gpm to the 1st Cleaners.
- Rougher tails flow at 7.41tph solids and 9.34tph water in a slurry running 49gpm to the Tailings thickener. The tails thickener (and filter) are located in the Tailings Filter Building (**Figure 3-10**).

Cleaner Flotation, Concentrate Thickening, Filter & Bagging (Figure 3-8)

There are 4 cleaner cells, each with a capacity of 87ft^3, totalling 346ft^3. The cells operate in series.

- 1st Cleaner concentrates flow at 0.37tph solids and 2.10tph water at a rate of 9gpm and report to 2nd Cleaner.
- 1st Cleaner tails flow at 1.48tph solids and 8.88tph water at a rate of 38.7gpm and report to Tailings Thickener.

- 2nd Cleaner concentrates flow at 0.09tph solids and 0.51tph water at a rate of 2.2gpm and report to the concentrate thickener.
- 2nd Cleaner tails flow at 0.28tph solids and 1.59tph water at a rate of 6.8gpm and report to the Tailings Thickener.

The Concentrate Thickener has a capacity of 113ft^3.

- Concentrates enter the Concentrate Thickener from the 2nd Cleaners and the Gravity Concentrator. Combined, tails flow in at 0.23tph solids and 0.53tph water at a rate of 2.5gpm.
- Concentrate Thickener U/F flows at 0.23tph solids and 0.13tph water at a rate of 1.0gpm to the tails filter.
- Concentrate Thickener overflow (water) is reclaimed to the mill building sump at a rate of 0.4ph at 1.7gpm then pumped to the process water tank.

The Concentrate Plate Filter has a capacity of 8ft^2.

- **Concentrate (80% solids) flows at 0.23tph solids and 0.06tph water at a rate of 0.6gpm.**
- Filtrate (water) from the plate filter is reclaimed to the mill building sump at a rate of 0.7tph at 0.3gpm then pumped to the process water tank.
- Any water that may spill within the facility will report to the sump which is then reclaimed into the reclaim water tanks.

Tailings Thickener & Filtration Building (Figure 3-9)

The Tailings Thickener has a capacity of 352ft^3.

- Tails enter the Tailings Thickener from the Roughers and the 1st Cleaners. Combined, tails flow in at 8.89tph solids and 18.22tph water at a rate of 85.8gpm.
- Tailings Thickener U/F flows at 8.89tph solids and 5.92tph water at a rate of 36.5gpm to the tails filter.
- Tailings Thickener overflow (water) is reclaimed to the mill building sump at a rate of 12.3tph at 51.6gpm then pumped to the process water tank.

The Tailings Drum Filter has a capacity of 8ft^2.

- **Filtered tailings (80% solids) flows at 8.89tph solids and 2.22tph water at a rate of 15.5gpm.**

- Filtrate (water) from the drum filter is reclaimed to the mill building sump at a rate of 3.7tph at 15.5gpm then pumped to the process water tank.
- Any water that may spill within the facility will report to the sump which is then reclaimed into the event pond.

Engineering (Figure 3-10)

- This facility is located in a separate, stand-alone building proximate to the FTL. The facility will be a 42ft x 36ft (1,512ft^2) structure.
- The foundation and structure design is shown in **Figure 3-10**.

Fig03-7_Rougher Flotation

Figure 3-7: Rougher Flotation

Fig03-8_Cleaner Flotation, Concentrate Thickener & Filter Press

Figure 3-8: Cleaner Flotation, Concentrate Thickener & Filter Press

Fig03-9_Tailings Thickener & Drum Filter

Figure 3-9: Tailings Thickener & Drum Filter

Fig03-10_Tailings Filter Building

Figure 3-10: Tailings Filter Building

3.3.5 AREA 800 REAGENT MANAGEMENT

REAGENT EQUIPMENT

Primary reagent equipment is shown in **Table 3-12**

TABLE 3-12: REAGENT EQUIPMENT

Equipment Description	Size
Air compressor & Receiver tank	-
Water Line	2”
Vault	4’x4’
Pump @ Vault	2hp
Pump @ FTL	2.5hp
Heat Trace	240V
Bulk Lime hopper	-
Lime Feeder / Screw Feeder	-
Reagent Metering Pumps	
Floc Mix tank	-
Feed funnel - syphon cone	-
Floc Mix tank agitator	-
Floc Mix tank transfer pump -	-
Floc Day / Dilution tank	-
Floc metering pumps	-

REAGENT DELIVERY

All reagents are delivered to site on trucks. Trucks will enter the site from either the secondary mill entrance off of US Highway 24 (just West of the Leadville Sanitation facility) or from the primary mill haul road via the AVS Aggregates Property.

Delivery trucks will make their way to the receiving area located to the East of the Mill Building. This is an (approximately 5,000ft2) area which allows for safe unloading (and loading) of reagents and other supplies. A Cat 277B skid steer will unload and load trucks.

REAGENT CONSUMPTION

Reagent consumption rates shown in **Table 3-13** are determined by metallurgical testing. The SDS sheets for these reagents is provided in Exhibit U.

TABLE 3-13: REAGENT USAGE RATES

Reagent	Function	Usage Rate (lbs/ton)	Daily Use (lbs)	Monthly Use (tons)
Lime (Ca(OH)2	pH Control	8.0	1,600	24
Aerophine (AP) 3418A	Promoter	0.11	21	0.32
Aerofloat 404, aqueous	Promoter	0.11	21	0.32
Aerofroth 65	Frother	0.04	9	0.13
Percol 351	Flocculent	0.03	6	0.10
Diesel Fuel	Equipment	-	-	1000-gal

Ph Control

- Lime is introduced the crusher conveyor in the Mill Building to MDM Bin conveyor to pre-condition the MDM prior to the addition of flotation reagents.
- Lime is required to maintain proper pH for the process. Very limited use of lime is anticipated. Testing has determined that in limited instances, up to 8lb/t or lime will be required.

Promotors & Frothers

- Promoters and frothers are introduced in the conditioning tank ahead of flotation.
- Promoters are reagents that increase the floatability of valuable minerals by making their surfaces more water-repellent, allowing them to attach to air bubbles.
- Frothers stabilize the air bubbles in a flotation cell, creating a persistent froth that carries valuable minerals to the surface for collection.

Flocculants

- Flocculants are introduced in the concentrate and tailings thickeners
- Flocculants aggregate fine particles into larger, heavier clumps (flocs) that are more easily separated from the water through settling or filtration.

ON-SITE INVENTORY

On-site reagent inventory is shown in **Table 3-14**. Lime will be stored in the Crusher Building. All other reagents will be stored in overpack containers in the Mill Building Reagent area. Diesel Fuel will be stored in a doubled-lined tank on South side of Mill Building. Lubricants will be stored in flame-protected metal cabinets.

TABLE 3-14: REAGENT INVENTORY

Reagent	Chemical Formula	State	Inventory tons	Duration days	Molar Mass g/mol	Density g/cm3	Melting Point ℃	Boiling Point ℃	Solubility g/100ml
Lime (Ca(OH)2	Ca(OH)2	solid	12	15	74.093	2.211	580	-	1.89
Aerophine (AP) 3418A	C8H18NaO2PS2	liquid	0.32	30	264.3	1.1	-	100	-
Aerofloat 404, aqueous	C8H19O2PS2	liquid	0.32	30	242.3	1.1	-7	104	1000
Aerofroth 65	C19.5H41O7.5	liquid	0.13	30	102	1.009	-	133	infinite
Percol 351	(C3H5NO)n	powder	0.10	30	High	-	-	-	-
Diesel Fuel	C8H18	liquid	3.51	30	2.82	0.72kg/l	-	-	0.91

Lime:

- 12 tons of lime is delivered bi-weekly in 1-ton super sacks. The skid steer moves the lime to the Crusher Building (Area 100) reagent area where it is stored.
- A crane or fork lift is used to fill a 2-ton feed bin with Lime. The bin will nominally receive 1-ton, or 2-tons one time per day, as required.
- A screw feeder places lime onto the MDM Bin conveyor at a rate of 282lb/hr.
- This is a dry process. Spills, if they occur, are swept up and placed in the feed bin.

Promoters and Frothers:

- These are AP3418A, AF404, and Aerofroth 65.
- These are all liquids and arrive in 200kg barrels. Two barrels each of AP3418A and AF404, and one barrel of Aerofroth 65 representing a 30-day inventory will be kept on-site.
- Barrels arrive on site monthly. The skid steer moves the reagent to the upper level of the Mill Building Reagent area where they are stored in overpack containers.
- Reagents are metered into the conditioning tank during operation.

Flocculent:

- Flocculent is delivered in 55-lb bags on a wooden pallet. The skit steer moves the reagent to the upper level of the Mill Building Reagent area where they are stored in overpack containers.
- Reagents are metered into the conditioning tank during operation.

LABORATORY

Laboratory reagents are discussed in **Section 3.3.6**.

OTHER REAGENTS

- Diesel fuel is used by the front-end loader at the FTL, the front-end loader at the crusher hopper, and the utility skid steer. 1,000 gallons is stored in a double-lined storage tank located on the South side of the Mill Building
- Gasoline will be used by the ¾-ton utility pick-up truck/snow plow. Extra fuel is stored on a 100-gallon tank mounted on the bed of the ¾-ton utility truck/snow plow. The utility pickup truck will be fuelled at a local gas station.

3.3.6 LABORATORY

The Laboratory is in the Mill Building and is accessed from the mill office area. The primary purpose of the Laboratory is to support mill operations. Activities are:

- pH monitoring
- Sample Preparation.
- MDM Analysis
    - Particle Size Analysis (PSA)
    - Bond Work Index (BWi)
    - Slurry Analysis

EQUIPMENT

Conventional laboratory equipment is used. Laboratory equipment is shown in **Table 3-15.**

TABLE 3-15: LABORATORY EQUIPMENT

Item	Description	Size	Power
1	Jaw Crusher	5" x 6"	3kW
2	Roll Crusher	10" x 6"	1kW
3	Pulveriser	¼"	3kW
4	Vibrating Screen & Screens	12" x 24"	0.3kW
5	Sample Splitter	10" x 18"	-
6	Laboratory Scale	-	-
7	Glass Measuring Cylinders	1-set	-
8	Vacuum Pump & Filters	12"	-
9	Pressure Pump w/ Flask Receiver	4L	-
10	Sample Drier Oven	-	0.25kW
11	Sieve Shaker & Sieves	-	0.25kW
12	Hot Plate	-	0.25kW
13	Meker Burner	-	-

14	AA Spectrograph & Testing Equipment	-	-
15	Vent Hood for AA sample prep and AA machine	-	0.25kW
16	Marcy Bulk Density Scale	-	-
17	pH Meter	-	-
18	Reagent Cabinet	-	-
19	Miscellaneous Laboratory supplies	-	-

REAGENTS

Laboratory reagents are required for AA assays. These are shown in **Table 3-16**.

TABLE 3-16: REAGENT CONSUMPTION, LABORATORY

No.	Reagent	Lab Inventory
2	Hydrochloric Acid (HCl)	2L
3	Deionized (DI) Water	20L
5	Distilled Water	8L

Hydrochloric Acid: Hydrochloric acid, also known as muriatic acid or spirits of salt, is an aqueous solution of hydrogen chloride (HCl). It is a colorless solution with a distinctive pungent smell. It is classified as a strong acid. It is a component of the gastric acid in the digestive systems of most animal species, including humans. Hydrochloric acid is an important laboratory reagent and industrial chemical.

Deionized Water: Deionized water, DI water, or demineralized water — is water that has had ions removed. Ions are molecules with a positive or negative electrical charge. In water, they appear as dissolved mineral salts.

Distilled Water: Distilled water is water that has been boiled into vapor and condensed back into liquid in a separate container. Impurities in the original water that do not boil below or near the boiling point of water remain in the original container. Thus, distilled water is a type of purified water.

LABORATORY OPERATION

Operating Philosophy:

The on-site laboratory is for plant operations only, and no regional or expletory samples are processed.

Sample Types:

- Hard Rock (mill feed)

- Slurry (Ball mill / Cyclones / Flotation circuit)
- Solution Samples

Operating Procedure:

The plant operates as conventional flotation system. No Fire Assay, Acid digestions or other techniques will be used.

Hourly grab samples are adequate for initial plant operations. Advanced or automated devices will be considered for future expansions or controls.

All samples are properly labeled and delivered to the laboratory or the **Sample Preparation Area (SPA)**.

Hourly Sampling will occur at the following locations:

- **Plant Feed** – cross belt samples are taken by shutting off the conveyor momentarily, to take a 8-10" "Cut" across the belt. This approximates 1-2 shovels full of material per hour per 12-hour shift, resulting in 12 samples per shift, which in turn will be composited to create a representative sample. This will result in two (2) ore samples that represent the plant's daily "Head Grade" or grade of the ore being feed to the plant.

  The conveyor belt (100-CV-09) crushed feed to the Fine MDM Bin is the sampling point. The composite sampling period is adjusted to the desired frequency.
- **Ball Mill** - Slurry exiting the ball mill is checked for particle size and proper grind size via sieve screen, as well as a Marcy pulp scale test to confirm percent solids. Additionally, the pressure gauge on the cyclone is checked to confirm that it is operating at the correct pressure.
- **Flotation Circuit Feed** – Rougher and Cleaner cells have a small slurry sample, ±100ml dipped from the tank. The sample is filtered and the solids dried and eventually assayed for metals content.

Plant Mass Balance (Metals Recovery)

Crushing & Flotation

- The analysis of the plant feed Head grade is the value of the material entering the plant.
- The analysis of the slurry (dried solids) the Rougher cells is the tails exiting the plant.

Subtracting the Head by the Tails equals metals recovered from the MDM (Plant feed).

Daily Sampling

Hard Rock (mill feed)	2 – 5-gallon buckets
Slurry-Ball Mill/Cyclone	24
Concentrate	48

This is for plant operations only, pH, lime, and percent solids are in addition to the above.

SAMPLE PREPARATION & TESTING

Samples are prepared in the Sample Preparation Area located on the East side of the Mill Building.

Samples are:

1) Delivered in 5-gal buckets and stored in the sample preparation Conex located outside of the laboratory. Samples are dry (≈4% moisture).
2) Emptied on the floor of the Conex for compositing but mixing them with a shovel.

Preparation Procedure:

1) If the sample is too wet, empty the sample directly into the pan and dry thoroughly.
2) Dry any sample that appears too wet for the jaw crusher.
3) Samples that contain any +⅛" material must be jaw crushed first before splitting. NOTE: Clean jaw crusher thoroughly before and after use. If fine adjustment -⅛" cannot be obtained, clean out material behind the faceplates.
4) Split 100% of the sample from the pans until an approximate 500 grams split sample is obtained.
5) Remainder or reject of the sample is placed into its original sample bag after splitting or into the reject barrel unless otherwise indicated by Laboratory Manger.
6) Put pans containing samples in drying oven and heat at 450° F. for one (1) hour. After samples are dry, remove from oven and cool.
7) Pulverize the entire 500gram sample. Feel the sample coarseness. If it is not smooth powder, brush down the pulverizer to get the entire sample, and run it right back through again (adding it gradually). Repeat until a good grind is obtained.

8) Hand -roll the entire pulverized 500-gram sample 50 times minimum.
9) Place the entire prepared sample into a plastic lined bag and label as to it's contents.
10) Arrange the samples in proper numerical sequence on the pulp room counter.
11) Transfer the samples to the Assayer.

The Conex is swept after each sample preparation. Sweepings are introduced into the process in the Ball Mill Sump.

pH Monitoring

pH is a measure of hydrogen ion concentration. It is important that a high pH is maintained to maintain safety when CN is in solution. pH must be above 8 at all times.

A pH probe will be used. The glass probe of the pH meter contains two electrodes:

- Reference Electrode. The reference electrode never comes into contact with the test solutions. It has a stable and constant electrical potential.
- Conductor Electrode. The conductor electrode is immersed in saturated (3M) potassium chloride. It does come into contact with our test solutions through a porous membrane in which it is housed.

Also:

- The potassium chloride solution is conductive and has a neutral pH (7.0).
- The porous membrane is selective towards hydrogen ions.

Probe Operation

When the conductor electrode is dipped into our test solution, ion exchange takes place through the porous membrane. Since the test solution and the saturated potassium chloride have a different pH, and because the porous membrane permits the passage of hydrogen ions through it, hydrogen ions move to or from the test solution until equilibrium is achieved.

This accumulation or vacation of hydrogen ions from the conductor electrode changes its chemical potential. The chemical potential of the conductor electrode is measured and compared to the chemical potential of the reference electrode. The difference in chemical potential between the two electrodes is called their potential difference. And the probe converts the potential difference to pH using the Nernst equation.

Probe User Requirements

- Probe Maintenance.

  - The pH meter probe should never dry out. Keep the pH meter probe filled probe with saturated potassium chloride.
  - The probe should be stored in a solution of 3M potassium chloride (KCl).
- Calibrate Daily.
  - Use standard solution provided by the independent laboratory.
  - Do not store in H_2O, and especially not distilled H_2O, to maintain conductive KCl solution.
- Use Probe as Directed by Manufacturer
  - Keep the probe submerged in your solution during pH measuring process.
  - Take the probe out, wash it in deionized water, blot it with paper, put it in the storage solution, and wash again before putting it back into your solution.

3.3.7 DUST CONTROL

Dust at the MDM bunker is managed, as required, with water sprays.

Dust control within the Crusher and Mill Buildings is accomplished utilizing a 4,000cfm UAS Dust Hawg® horizontal cartridge dust collector. The dust collector is located in the Crusher Building, where virtually all dust is collected.

Dust is contained within the enclosed crusher building. Inside the crusher building, dust managed by use of a ducted exhaust air system which draws air from all transfer points. Dust from the screening, primary and secondary crushing circuits, conveyance systems, is limited to fugitive particulate matter. Negative pressure ventilation will direct venting to the dust collector to control the flow of fugitive particulate matter during screening and crushing operations.

Dust in the Mill building is limited to fugitive particulate matter. Negative pressure ventilation will direct venting of the dust collector at the head of the conveyor going into the Fine MDM bin.

The unit is estimated to operate at air velocities of 3,500-4,000fpm based on demand and manual control dampers at each collection point. The dust collector is rated at 4,000cfm and upgradable to 6,000cfm.

The dust control unit is designed to capture 28.2tpy crushed ore fugitive particulate matter and an additional 0.4tpy reagent fugitive particulate matter for a combined 165lb/day at a 99.8% at 0.5µm published design efficiency. The captured dust will be pulse-cleaned off the filters in the dirty air plenum and collected in drums and returned to the material flow in the grinding circuit.

3.4 SOLUTIONS MANAGEMENT

Water and solution management for the FTL is presented in Section 3.5.

3.4.1 PROCESS WATER

The process plant-wide water balance, shown in **Table 3-5**, operates at a 19.7gpm (0.04cfs) deficit. The deficit is primarily due to water lost in the filtered tailings and in the concentrate that is shipped to the smelter. Some loss is due to evaporation. The plant is zero-discharge, thus produces no effluent.

At the planned steady state production rate of 200 tons/day, the process plant contains approximately 27,000 gallons of water. This water contains approximately 2,400-lbs of lime, 4.5-lbs of AP3418A promoter, 4.5-lbs of AP404 promoter, 1.8-lbs AF65 frother, and 1.4-lbs of Percol 351 flocculent. Note that these values represent the quantum of reagent added and do not consider their consumption in the process. The instantaneous water and reagents in the process facility is summarized in **Table 3-17**.

TABLE 3-17: INSTANTANEOUS WATER & REAGENTS

Mech Equip No	Flow Sheet Ref	Process Equipment	Solid: Soln Ratio	% solids	Total Volume (ft3)	Ton Solids	Ton Water	Gal Water	Lime (lbs)	AP 3418A (lbs)	AP 404 (lbs)	AF 65 (lbs)	Percol 351 (lbs)
1	1	MDM Bin	2.70	96%	2,968	240	10	2,397	1,920	0	0	0	0
1	1-2	Ball Mill	0.31	77%	31	0.2	1	180	2	0	0	0	0
2	3-4-7	Cyclone	1.51	40%	-	-	-	-	-	-	-	-	-
3	4-5	Gravity Concentrator	1.41	42%	-	-	-	-	-	-	-	-	-
4	7-8	Feed Thickener Tank	2.08	33%	760	16	8	1,847	128	0	0	0	0
5	8	Conditioner Tank	1.86	35%	75	2	1	197	12	0.16	0.16	0.07	0.05
6	8-10	Rougher Flotation Tanks	1.51	40%	1,039	19	13	3,096	156	2.09	2.09	0.83	0.63
7	9-13-14	Cleaner Flotation Tanks	5.67	15%	346	9	2	388	73	0.98	0.98	0.39	0.29
8	13-15	Concentrate Thickener	1.67	38%	113	2	1	317	18	0.24	0.24	0.09	0.07
9	15-17	Concentrate Filter	0.43	70%	12	0	0	65	1	0.01	0.01	0.00	0.00
10	20-21	Tailings Thickener Tank	1.16	46%	352	6	5	1,221	47	0.63	0.63	0.25	0.19
11	21-23	Tailings Filter	0.43	70%	372	3	8	1,947	28	0.37	0.37	0.15	0.11
12	15-17	Concentrate Filter	0.43	70%	37	0	1	194	3	0.04	0.04	0.01	0.01
13	26-28	Reclaim Water Tank	-	0%	545	0	17	4,075	0	0.00	0.00	0.00	0.00
14	-	Fresh Water Tanks	-	0%	1,378	0	43	10,303	0	0.00	0.00	0.00	0.00
		TOTAL			**8,029**	**298**	**109**	**26,227**	**2,388**	**4.52**	**4.52**	**1.81**	**1.36**

- Make-up water is supplied by Parkville Water District and is partially delivered to site using a water line owned by Leadville Sanitation.

  Makeup water originates from:

  - Fresh water tanks at 6.67tph (26.6gpm). This water is contained in 2 fresh-water tanks having a total capacity of about 10,000 gallons.
  - The Landfill Leachate Collection Pond (LLCP) will nominally contain a de minimis amount of water. When available, this water displaces the fresh make-up water in the process water balance. The LLCP occupies an area of approximately 5,000ft^2 and has a volume of approximately 27,000ft^3, or about 200,000 gallons.
  - FTL. Meteoric water that is captured in the FTL will be released back into the environment as discussed in Section 2.4.

- Reclaim water originates from:

  - MDM Thickener at 0.84tph (3.5gpm), **Figure 3-5, Stream 19**,
  - FTL Thickener at 12.3tph (51.6gpm), **Figure 3-5, Stream 22**
  - FTL Filter at 3.7tph (15.5gpm), **Figure 3-5, Stream 24**,
  - Concentrate Thickener at 0.4tph (1.7gpm), **Figure 3-5, Stream 16,**
  - Concentrate Filter at 0.07tph (0.3gpm), **Figure 3-5, Stream 18,** and
  - Waste water from the laboratory, di minimus amount.

3.4.2 FIRE WATER

Fire Water is supplied from a 12,000-gallon water tank and hydrant located on the North side of the upper facility area haul road approximately 110-ft from the Mill Building. This tank is accessible by the fire department via the mill access road as well as the truck haul road. This tank is dedicated for fire protection and is not plumbed to supply process water to the facility.

Water to the tank is supplied by Parkville Water District and is piped in from the same water line used for process make-up water.

The existing Leadville Mill CUP (Lake County File 11-11) mandates a 10,000-gallon fire water tank.

3.4.3 POTABLE WATER

There are 2-500-gallon stainless steel water tanks in the Mill Building. These exclusively store potable water. There is also a hot water tank. Hot and cold water is available for use in the rest-room and kitchen. Water for these tanks is supplied by

Parkville Water District and is piped in from the same water line used for process make-up water.

Bottled water is provided for employee and visitor consumption.

The existing Leadville Mill CUP (Lake County File 11-07) mandates 1,000-gallons of potable water storage at the plant.

3.4.4 WASTE WATER

The Mill Building is connected to the Leadville Sanitation District sewer line. This line runs directly through the property about 150-feet north of the Mill Building. Waste water from the lavatory and sink report to the sewer line.

Waste water from the laboratory is reclaimed in the process plant.

3.4.5 SPILL CONTAINMENT

Mill plant facilities have primary containment and sumps. In the event of a catastrophic failure involving these sumps being breached, solution will report – via gravity – to the LLCP.

CRUSHER BUILDING

Area 100 consists of the Crusher Building. There are no solutions in the Crusher Building.

MILL BUILDING

The Mill Building consists of Area 200-Grinding Circuit, Area 300-Flotation Thickening and Filtration Circuit, and Area 800-Reagent Storage.

For security, the Concentrate Room contains the concentrate bagging machine and concentrate super sacks awaiting shipment to the smelter. There are no solutions in the Concentrate Room.

All spills report to the Mill Building sump. Spill containment measures within the Mill Building are:

- <u>Curbing</u>. Curbs are constructed at the;
  - Man-doors at the mill office and West wall, and
  - Overhead doors, upper level on East side, and main level on West side.
- <u>Sealant</u>. Mill Building floors are sealed.
- <u>Sumps</u>. If they occur, Mill Building spills will report to the;
  - Solutions in Main Building. At steady state there are approximately 25,000 gallons of solution within the Mill building.
  - Primary Sump. The primary sump is the entire South side of the Mill Building, which is the lowest elevation. Spills will report to the primary sump via gravity. The primary sump capacity is 5,000 gallons which is approximately 20% of solutions within the Mill Building. Solutions reporting to the primary sump will be pumped into the MDM Thickener (Area 200).
  - Tailings thickener. The tailings thickener containing approximately 1,200 gallons of solution (inclusive of the overall plant solution inventory) is located outside of the Mill Building (South side). The thickener is connected to the LLCP with a lined concrete trough. Any spills will flow via gravity into the LLCP.
  - Secondary Sump. If the primary sump overfills, solution will report via gravity to the LLCP. The capacity is approximately 200,000 gallons or 7.5x of all process plant solutions. Since the LLCP is a sump it is almost certain that process plant solutions will not breach this facility.

  - FTL. In the highly unlikely event that the LLCP is breached solution will report to the FTL where freeboard capacity will more than accommodate the volume.

TAILINGS FILTER BUILDING

The Tailings Filter Building houses the Head Tank and Drum Filter. Similar to the Mill Building the building itself serves as primary containment.

Spill containment includes:

- Curbing.
  - The foundations include curbed concrete.
- Sealant. All concrete is sealed.
- Sumps. If they occur, spills will report to the;
  - Primary Sump. A 18ft^3 sump located within the FTD Filter Building. The capacity is 135 gallons. Solutions reporting to the sump will be pumped into the Drum Filter Head Tank, and
  - Secondary Sump. The LLCP via gravity in a concrete lined trough.

LANDFILL LEACHATE CONTAINMENT POND

The LLCP design and is discussed in Section 3.5. Design criteria include:

- Facility is a sump with enough capacity to contain all solutions accosiated with plant operations.
- Pond excavation limited to 8ft with 2:1 depth and does not impact aquifers at 80-100ft depth below the surface.
- Embankment construction using available onsite soils borrowed from the containment site area as outlined by CTL Thompson, Inc., Permeability Study, April 10, 1990, and Slope Stability Evaluation, July 8, 2011.
- Compaction during construction.
- Zero-discharge facility.
- Observation well down gradient from FTL is maintained in its current location and monitored.
- Geosynthetic clay liner of 1 x 10^{-6}cm/sec permeability (or less), or equivalent material liner.
- Synthetic pond liner of 90-mil HDPE.
- Compaction testing during construction.

3.5 DRY TAILINGS LANDFILL (DTL) & LANDFILL LEACHATE COLLECTION POND (LLCP) DESIGN AND OPERATION

3.5.1 TAILINGS CHARACTERIZATION

Tailings in slurry form are produced in the flotation and gravity circuits after gold and silver concentrates are produced by conventional methods as the saleable products from the metal recovery operations. Tailings slurry with solids content (by mass) of between 30% and 40% is pumped to the filter/dewatering plant. Dewatering is accomplished by a disk filter that yields a nominal 20-mm-thick cake of between 75% and 80% solids (25% to 20% water content by mass). Water recovered via filtration (filtrate) flows via gravity into the LCCP for recycling back into the process in a closed loop. The filter cake produced by the drum filter drops onto a discharge conveyor that discharges into a stockpile inside of the adjacent Dry Tailings Landfill (DTL). The DTL is a retro-fit of the existing hydraulic slurry impoundment (pond/dam) to function essentially as an industrial solid waste landfill where the dewatered tailings filter cake can be mechanically placed within the lined containment of the original double synthetic lined tailings pond. This transition in form and function requires the placement of a drainage blanket at the base of the pond, which provides a mechanism for the continuous drainage of the deposit to maintain unsaturated and stable conditions. These conditions are required in order to satisfy two main design objectives: to allow mechanical placement and handling of dry tailings using low-ground-pressure mobile earth moving equipment; and more importantly to transform the structure from a hydraulic impoundment to an engineered fill to contain the stable and dewatered tailings filter cake on all sides on a consistent basis and thus eliminate the development of hydraulic pressure at the base of the deposit through continuous removal of leachate and infiltrating meteoric waters and snowmelt. The design features of the DTL transformation are discussed in greater detail later in this section.

For its original intended purpose as a tailings impoundment, the characterization of the tailings solids was necessarily focused on its geotechnical properties, with their geochemical characterization being of secondary importance as the design incorporated a double synthetic lined concept suitable for any type of waste containment including those characterized as hazardous. With the transformation of the pond from hydraulic structure to a simple earth material repository, the geotechnical characteristics of the anticipated tailings filter cake are only of consequence once the level of the filling extends over the rim elevation of the pond as the dewatered solids (filter cake) is contained on all four sides of the facility. Regardless of the minimal design and operational impact of the mechanical and geochemical quality of the anticipated flotation tailings filter cake, process simulations at laboratory scale were carried out to generate representative tailings samples using feed composites assembled from both drilling and bulk samples of Penn Group dump material. Simulations included all anticipated process steps, including crushing, grinding, gravity and flotation concentrate production, as well as liquid solid separation and filtration of a final (reject) tailings slurry, which constitutes approximately 85% of the original feed ore mass. These tailings were then prepared for a battery of characterization tests that were specifically designed to yield important information about their geochemistry, physical and geotechnical properties, and more importantly, their potential to generate acid, dissolved metals, and other potentially toxic substances during the flotation and gravity concentrate production processes. **Table 3-18** below outlines the tests and methods applied during this evaluation, which at the time of this reporting, were still in progress.

TABLE 3-18: TAILINGS CHARACTERIZATION TESTING OUTLINE

Test	Method
Total Sulfur	Sobek 3.2.4
Neutralization Potential	Sobek 3.2.3
Moisture	ASTM D2216
Paint Filter	9095A
Paste pH	USDA60
Gross Alpha	EPA900.0
Gama Spectroscopy	EPA901.1
SPLP CDPHE1 Metals and GPV analytes	6020/7470

[1] CDPHE Groundwater Protection Values (GPV)

The SPLP testing program included all of the required elements in the approved surface and groundwater sampling and analysis plan, in strict accordance with CDRMS guidance. The basic objective of this element of the characterization plan was to ensure that the quality of the contact solutions and filtrate could be applied as guidance in the future should any of the baseline constituents be detected during future routine groundwater and surface water monitoring testing. A more detailed discussion of the surface and groundwater sampling and analysis methods and protocols are provided in Exhibit U.

As mentioned previously, due to the general nature of the retro-fit tailings management system design to transition to a below-grade solid-waste storage repository, the additional tests outlined provide important information about the potential character of the anticipated tailings filter cake and have been included for completeness sake. Extensive prior testing of tailings residues produced from various leaching process alternatives provide some general guidance on the anticipated character of the tailings solids and leachates but are not applicable to the current process included in this permit amendment. However, the geochemistry of the existing on-site covered ore and tailings stockpiles (see **Figure 5-4** for location and relative sizes) has been addressed using SPLP leachability standards as requested by CDRMS. These materials are planned for processing or alternatively, off-site disposal to remove them from the permit affected area during start-up process operations as they may contain economic levels of precious metals. These results are presented in Exhibit U.

Table 3-18 provides a summary of test performance data from the drum filtration tests carried out on representative tailings slurry samples from earlier work at laboratory scale and are presented as a general example of expected filtration effectiveness. These data are considered to remain valid as the particle size distribution of the final tailings solids are not expected to substantially different from earlier tests as the grinding circuit has remained essentially identical. The design target water content of between 20% and 30% will yield physical properties that allow for mechanical handling and placement of the tailings in the DTL. Optimization of the filtration plant design, including the utilization of advanced flocculants for more rapid and consistent filtration performance are ongoing. The samples included in this early round of filtrations tests also contained a relatively high percentage of clay-sized particles than might typically be encountered in the Penn Dump material, and therefore the results are conservative from the perspective of anticipated drum filter performance.

TABLE 3-19: FILTRATION DATA

Sample Test	Cake Thickness (mm)	Filter Cake (% Solids)	Filtration Rate (lbs_{dry}/ft^2-hr)
1 (Vacuum)	9.0	73.1%	97.0
2 (Vacuum)	20.0	71.4%	29.6
3 (Vacuum)	9.0	75.6%	56.9
4 (Vacuum)	19.0	75.2%	22.4
5 (Pressure)	8.0	80.6%	448.2
6 (Pressure)	8.0	82.2%	544.4
7 (Vacuum)	4.8	75.4%	91.7
8 (Vacuum)	22.0	71.5%	155.4
9 (Vacuum)	22.0	71.5%	421.5

3.5.2 DTL DESIGN & OPERATIONS

FACILITY GENERAL ARRANGEMENT

Figure 3-1 and **Figure 3-11** illustrate the general location and geometry of the existing lined impoundment that will be retro-fitted as a solid waste landfill, now referred to as the Dry Tailings Landfill (DTL). The DTL being proposed under this permit amendment is intended to provide interim, start-up storage capacity to accommodate approximately 12 to 15 months of initial plant operations. Once full capacity has been reached, it is anticipated that a larger surface landfill will have been permitted and in operation, and that the Phase 1 DTL can be subsequently decommissioned and reclaimed per the approved plan as described under Section 4.

The transition from hydraulic impoundment to DTL requires the installation of several key operational features:

1. The installation of a geocomposite drainage layer, which also serves as a protective barrier for the existing underlying synthetic liner system;
2. The placement of a 2-ft.-thick operations layer (Detail 5, **Figure 3-12**), consisting of fine slag form the adjacent AVS property. This layer is also highly permeable and with function both as a protective layer, and as an additional drainage blanket zone at the Base of the DTL;
3. The construction of an access ramp (Detail 6, **Figure 3-12**) in the northeast corner of the DTL that will be constructed with a combination of fine slag placed over a layer of geocomposite, and a top working surface constructed from Geoweb (cellular confinement subsystem) mat that will be fill with compacted aggregate, also sourced form coarser slag from the AVS property. Both the Geoweb and the geocomposite will be anchored in a separate trench located outboard from the existing anchor trench for the geosynthetic liner system (Detail 2, **Figure 3-12**); and
4. Installation of a perimeter collector perforated piping system (**Figure 3-11**), encased on coarse aggregate and wrapped in geotextile that will lead to a collection sump equipped with a sump riser and fitted with a submersible leachate pump (Detail 7, **Figure 3-12**; **Figure 3-13**). Collected leachate and infiltrating precipitation and snowmelt that flows through the pipe system to the sump will be continuously removed and directed via a discharge pipe into the Landfill Leachate Collection Pond (LLCP) and eventually back into the process as make-up water.

The design features are detailed on **Figure 3-11** through **Figure 3-13** in both plan and section, which also include references to general material specifications. These design features provide for a practical transition to dry tailings storage within the previously established hydraulic impoundment. The main objectives, as stated earlier, are to provide for continuous underdrainage of the placed dry tailings filter cake to maintain fully unsaturated conditions, and allow for mechanical placement and handling with light earth moving equipment. The new design also guarantees that no surface waters will be impounded, and the access ramp will provide an additional margin of safety for general access as well as protection against unwanted entrapment of wildlife or waterfowl.

PROPOSED FACILITY OPERATIONS & CONTROLS

Overview of Basic Unit Operations

The dewatered tailings filter cake from the filter plant will be transported via a small, covered overland conveyor section to a 15-ft. long discharge conveyor located at the northern edge of the DTL as illustrated on **Figure 5-4** and **Figure 3-11**. Filter cake will drop vertically into the DTL on to a protective apron of geocomposite and geonet to form a stockpile cone of material. From the inside of the DTL, light earth moving equipment (skid steer) will access the edge of the stockpile (skid steer will use the access ramp to for ingress and egress from the bottom of the DTL) and spread the dry filter cake as required to maintain a general slope toward the access ramp to promote shedding of direct precipitation and runoff through the ramp into the underlying drainage pipework and eventually into the collection sump. Snow will be regularly plowed to a convenient area where it can be managed to maximize melting and drainage into the underdrainage collection system.

Once a sufficient layer of tailings filter cake has been placed to totally cover the operations layer and consistently graded, it is anticipated that the majority of the precipitation runoff and snowmelt can be diverted directly into the underdrainage system, as the compacted tailings will be of lower permeability and therefore promote runoff to the edge sections of the DTL and ramp areas rather than infiltration. Filling of the DTL will proceed under this general methodology until the limit of waste (Detail 1, **Figure 3-12**) is being approached on the perimeter areas of the deposit.

Once the perimeter limit of waste has been reached (see Detail 1 on **Figure 3-12**) the process of building a general 4:1 interior slope with the dry tailings will commence. This will occur near the end of the facility working storage capacity and will generally be part of the final surface reshaping operations that will precede capping and final reclamation. Through this process, the perimeter limit of waste will be consistently maintained to avoid any placement of tailings outside of the lined areas of the DTL. This approach will also provide surplus stage capacity and allow for continued operations prior to permitting and commissioning of a new landfill as part of the second phase of project development beyond the 110 permit restrictions.

Placement of dry tailings above the designated interior limit of waste elevation (approx. 9690.00 ft. elevation) will be carried out using a different protocol. Tailings will be spread in 6-in. lifts and compacted to 90% of optimum Standard Proctor density and within ± 5% of optimum moisture. A Construction Quality Assurance (CQA) plan will be developed and approved by CDRMS prior to commencement of any waste placement activities that occur above the maximum vertical limit of waste elevation defined in this application (minimum 2 ft. below crest of existing liner exterior berm). This process will create a final waste surface profile that will be guarantee long-term stability and allow for successful placement of the approved final reclamation cover system. **Figure 3-14** provides a conceptual design plan showing the proposed top of waste contours and details of the reclamation cover system components. **Figure 3-15** provides a cross section of the DTL illustrating the final waste and component cover elements that form the basis of the final reclamation plan described in Section 4.

Figure 3-11: DTL Leachate Collection System Piping

Figure 3-12: DTL Sections & Details

Figure 3-13: DTL Collection Sump Details

Figure 3-14: DTL Reclamation Final Contours

Figure 3-15: DTL Final Reclamation Configuration

General Operational Guidelines

The following points highlight important elements of dry tailings management that will be incorporated into the Facility Operations Manual.

1. Tailings should only be delivered to the DTL transfer conveyor when the drum filter is producing filter cake within 3% of the target acceptance lower limit of 75% solids (25% water content). Filter cake that has water content above this limit (i.e. >28%) could be acceptable for placement if it passes the Paint Filter Test and may be placed in the DTL stockpile on a temporary system upset basis and allowed to drain down to water content that allows for effective spreading and compaction. However, normal protocols would dictate returning out-of-specification (high water content) tailings to the agitated slurry receiving tank for repulping and re-filtration. The primary and ultimate acceptance criterion for filter cake into the FTD is passing the Paint Filter Test (no free water bleed). The operational target water content of 25% described above should ensure that both the Paint Filter criterion and that effective mechanical handling and mobile equipment operations can be consistently achieved.
2. If the material is within the limits described in No. 1 above, the material can be stockpiled and placed in the DTL.
3. One potential option for placement of under-specification filter cake is to provide a mechanism for blending with fine slag as a means of reducing relative water content and improving the strength of the delivered final waste stream to allow for mechanical handling and placement. This option should only be considered after other options for improving filtration plant effectiveness have been exhausted, as the slag admixture essentially consumes valuable lair space in the landfill, and increased management costs.
4. At the start-up of surface placement operations, a series of field trials will be carried out to allow for a method specification to be finalized that ensures general compliance with the field requirement of placed filter cake (visual capability of mechanical handling with light earth moving equipment from the internal delivery stockpile). This effort will be applied in the assembly of the final CQA plan for placement of waste above the maximum top of waste limit defined at the exterior boundaries of the existing DTL liner system (i.e., 2 ft. minimum below the crest of the existing exterior liner berm).

3.5.3 WATER AND SOLUTION MANAGEMENT

SOLUTION COLLECTION & MANAGEMENT

Solutions (filter cake drain down, direct precipitation runoff and snowmelt) that report to the DTL underdrain and collection sump are pumped into the LLCP for recycle to the process. The original leak collection and recovery system (LCRS) for the existing synthetic liner system will continue to function as designed and will be monitored regularly as an indicator and removal of any small leakage that could develop in the primary, inner geosynthetic liner layer. The LLCP is designed as a double, geosynthetic lined pond with leak detection. The configuration includes and inner 60-mil HDPE liner and an outer textured HDPE liner over a prepared subgrade. Sandwiched between the two layers is a HDPE geonet layer that functions as the LCRS. Fluids are recovered from the pond via a pump, installed inside of a pipe riser, or in a floating barge, the final configuration of which is still under consideration. The LLCP has a design capacity of approximately 200,000 USG plus 2 feet of freeboard. The pond is designed to hold a typical operating solution volume and will be operated to be able to contain 300% (about 30,000 USG) of all the solutions circulating in the plant in the event of a catastrophic failure of all containment systems.

The DTL leachate collection system design is consistent with current industrial practice for solid waste landfills in Colorado. The major difference in the operational strategy of the Leadville Mill DTL versus a typical solid waste landfill is that the leachate collected is completely recycled to the process as make-up solution. In the case of the typical solid waste landfill, these leachates are regularly reapplied to the surface of the landfill (via irrigation) to be lost through evaporation or for dust control in the active waste placement areas. This option could be implemented at Leadville prior to placement of the final reclamation cover until very small amounts of leachate are being recovered which would signal appropriate timing for the placement of the final cover.

The current water balance for the plant indicates a significant deficit that can be partially covered with the collective volumes being managed in the DTL as well as the filtrate from the dewatering of the tailings. Details of the water balance and process solution flow distributions are discussed in detail in Section 3.2.1.

4.0 RULE 6.3.4: EXHIBIT D–RECLAMATION PLAN

4.1 GENERAL REQUIREMENTS

The Process facility site is zoned by Lake County as Industrial/Mining (IM). Affected Land reclamation is consistent with supporting IM uses. Reclamation activities are based on the following criteria.

4.1.1 POST MINING LAND USE

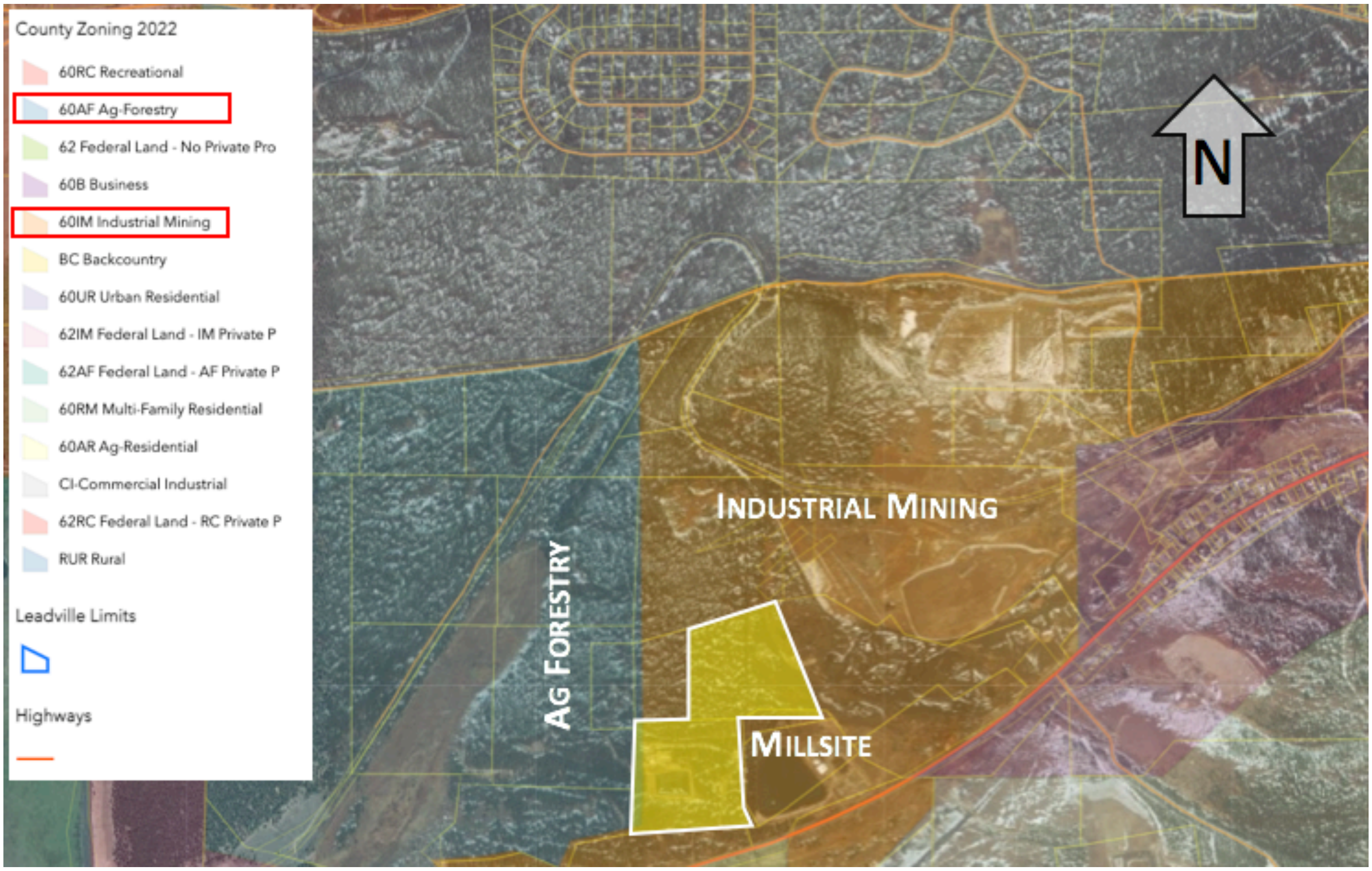
The Mill is located on land zoned Industrial Mining (IM) by Lake County. Other IM properties bordering the Mill include;

- A historic mill site (Leadville Gold and Silver Mill) owned by Salem Minerals to the North,
- The historic Leadville Corporation (currently in bankruptcy) process facility to the northeast,
- The AVS Aggregates Project (owned by CJK Milling) to the East, and
- The Leadville Sanitation municipal sewage treatment plant to the southeast, and a parcel with a proposed concrete batch plant to the South.

The land bordering the Mill on the West is zoned Agriculture Forestry (AF) by Lake County. There are 4 residential properties located proximate to the Mill.

Lake County's long-term plan indicates that the IM zoning for the Mill and all properties East of the AF zone will remain IM. This is supported by Lake County's zoning map shown in **Figure 4-1**.

Figure 4-1: Lake County Zoning Map



4.1.2 CLOSURE CRITERIA

Post-closure reclamation is based on the following criteria:

- Reclamation action is consistent with IM use.
- Each reclamation task is completed assuming the worst-case scenario.
- No substituted land is reclaimed.
- Grading is to approximate original contours - and in compliance with the SWMP, with the following exception:
  - The FTL is graded to it final design contours.
  - The LLCP is graded as a road.
- Metal buildings/structures marked for reclamation criteria;
  - Structure demolition,
  - Scrap sent to recyclers,
  - Concrete foundations removed and placed in LLCP, and
  - No credit for salvage value.

- Processing equipment and transportable structures (e.g. ore prep steel container) include;
  - Removal, and transport to 3rd-party purchaser or scrap recyclers.
  - No credit for salvage value.
- Mobile equipment criteria;
  - Remove equipment from Mill property to off-site CJK property for sale or salvage.
- Un-opened reagent containers are returned to vendors or sold to other operations permitted for their use.
- Diesel fuel to be given to employees or construction/operations contractors. Note this is not "Red Fuel", and so is legal for road use.
- Process solutions and opened reagents are placed in the LLCP
  - This task is completed prior to closing LLCP.
  - Opened reagent containers that cannot be returned to vendor or sold to other operations permitted for their use are dissolved in residual process water.
  - The process solution then reports to the LLCP.
  - Solution in the LLCP will be sprayed on the embankment (35-mil PP liner) where water will evaporate leaving a dry residue.
  - LLCP backfilling will then commence
- Backfilling of LLCP requires;
  - Requisite compaction to enhance stability and prevent leaching into groundwater.
  - The following items are backfilled.
    - Reagent residue,
    - Concrete foundations, and
    - LLCP GCL and HDPE liners, and leak detection system.
- Grading, Topsoil & Revegetation
  - Disturbed areas are graded to approximate original contours, with exception of FTL.
  - Graded areas are covered with topsoil and revegetated. This activity is implemented as follows:
    - Upon commencement of operations, reclaimed topsoil, SPGM and tailings is analyzed for growth suitability.
    - Based on growth suitability studies, 6-inches to 12-inches of cover material is placed on graded areas.
    - Soil amendments are applied based on growth suitability studies.
    - Seed mix, as approved by CDRMS, and shown in **Table 4-1** is applied.

TABLE 4-1: RECLAMATION SEED MIX

Species	Scientific Name	Variety	Pls lbs./Acre
Yarrow	Achillea Lanulosa	-	0.1
Groundsel	Senecio Atratus	-	0.1
Lupine	Lupinus Perennial Lupine	-	1.0
Slender Wheatgrass	Elymus Trachycaulus	San Luis	1.4
Nodding Brome	Bromus Anomalus	-	2.5
Sheep Fescue	Festuca Ovina	Covar	0.5
Hard Festuca	Festuca Ovina Duriuscula	Durar	0.5
Red Fescue	Festuca Rubra	Penniawn	0.5
Tufted Hairgrass	Deschampsia Caespitosa	-	0.5
Redtop	Agrostis Alba	-	0.1
Blue Wildrye	Elymus Glaucus	-	1.75
Muttongrass	Poa Fendleriana	-	0.5
		Total pls lbs./acre (drilled)	**9.45**

4.1.3 EXCLUSIONS

The following infrastructure will remain in place, post operations to support future IM uses and post-closure mitigations, **Figure 5-5**.

- Site Access Road from US Highway 24 (South of site)
- Main Access Road from AVS property (East of site)
- Electric power line and transformer.
- Fresh water lines
- Fire Water Tank
- Mill and Crusher Buildings, including the following items these structure;
  - Structure/foundation
  - Concrete retaining walls associated with these buildings
  - Electric switchgear
  - Fresh water tanks
  - Office furnishing
  - Laboratory furnishing
  - Rest room
  - Sewer system, including lift pump system
- Landfill Leachate Collection Pond.
- FTL sump will remain in place.
- Monitoring wells LM-MW2 and LM-MW3 will remain for future monitoring, as required.
- Nosie, air quality, and seismic monitors.
- Access gate

4.2 IMPLEMENTATION

Reclamation activities are broken down into tasks, as shown in **Table 4-2**, and described below.

TABLE 4-2: RECLAMATION AREAS

Task	Reclamation Area
10	Historic Stockpiles & Tailings
20	MDM, Slurry, Reagents & Solutions
30	Structures & Equipment
40	Filtered Tailings Landfill & LLCP
50	Grading, Cover & Seeding

4.2.1 NO START-UP

If the Permit Amendment is denied, and closure is mandated by CDRMS, then the existing reclamation closure plan applies.

4.2.2 TASK 10 – HISTORIC STOCKPILES & TAILINGS

The Leadville Mill is an historic operation with legacy RoM stockpiles and tailings. Existing ore stockpiles and tailings have been stored on site since approximately 1991.

There are 3 historic stockpiles totalling approximately 1,500 tons which lie on unlined areas. As required in the existing permit, these piles are maintained using best management practices (BMPs) including plastic covers and down-gradient perimeter straw wattles.

There is also a tailings pile containing approximately 900 tons of tailings. This pile was moved to the northwest end of the Mill property under TR-5. This is also maintained using the same BMPs as the stockpiles as well as a temporary 6-mil polyethylene plastic sheeting (PPS) (often referred to as Visqueen©, a PPS brand) liner.

PRE-START-UP ACTIVITIES

The existing permit mandates that the stockpiles and tailings pile be removed within 60 days of project start-up. It is planned that this requirement also applies to this permit application.

- Current Activities. The following mitigations are observed prior to mill start-up.
    - The stockpiles are covered with reinforced polyethylene plastic sheeting PPS liner approximately 40ft x 100ft in size, with edges folded and pinned, and held in place by tires, blocks, rocks and/or other suitable ballast.

  - The water runoff from the reinforced PPS is passed through erosion and sediment control measure consisting of wattles and vegetative filters.
  - Reinforced PPS is replaced as needed.
  - Stockpiled ore will be sampled, and a Synthetic Precipitation Leaching Process (SPLP) analysis will be performed, as outlined in the Division's August 27, 2009, letter prior to removal and prior to milling or disposal.
  - Upon commencement of operations, a stockpile removal schedule will be provided to CDRMS, and
  - Weather permitting, historical stockpiled material will be removed and disposed within 60-days of production start.
  - The stockpile material will be reprocessed or disposed of the FTL or other approved facility.

- Contemporaneous Activities.

  - Mill Start-Up. This material is used for plant start-up, and is reclaimed in this order. There is no cost associated with removing the tailings or stockpile material since this material is processed as MDM.

    - Temporary Tailings. located on North side of Mill Building.
    - Stockpile 1, located East of FTL.
    - Stockpile 2 & 3 combined, located on East side of Mill Permit Boundary. Stockpile 3, although small, has high clay content and will be reclaimed together with Stockpile 2.
  - Activity 1 – Pile Covers & BMPs
    - Remove straw wattles, silt fence, and covers.
    - Haul waste material to landfill.
  - Activity 2 – Grade & Seed
    - Grade/scarify ground at tailings pile and stockpile areas
    - Bring in topsoil/SPGM
    - Spread/dress topsoil/SPGM
    - Apply mulch to stockpiles areas only (as required).
    - Apply seed to stockpile areas only.

POST-CLOSURE ACTIVITIES

There is no post-closure activity contemplated for Task 10. All activities occur during start-up.

4.2.3 TASK 20- MDM, SLURRY, REAGENTS & SOLUTIONS

In the event of any shut-down, the first step in closure is to remove all MDM, slurry and reagents from the process plant.

MDM exists in the receiving Bunkers, crushing hopper and conveyors, and the fine MDM Bin. Slurry exists in the entire process from the Ball Mill to the FTL. Reagents exist (1) in as-received containers, (2) opened containers as required for processing, or

(3) as solutions in-process. Small amounts of chemicals also exist in the laboratory, and diesel fuel is in its double-lined storage tank.

POST CLOSURE ACTIVITIES

- Activity 1. Clear Facility of All In-Process Material.
    - Purge Process Facility.
        - Operate facility as designed, but without reagents. The most effective method is to run the material through the process plant. This will also help in flushing reagents from the equipment.
        - Assume maximum of 1,000 tons (400-tons in bunker and 200-tons in MDM Bin) of material is in process. All material is processed within 72-hours. Note that the process cannot be "sped-up" as the FTL filter must still meet the moisture requirement for FTL deposition.
        - This process is complete when clear water reports to the FTL Filter. As per the flowsheet, all water from FTL is reclaimed within the plant. At this point, all tanks and piping are clear of solid materials.
        - All solutions in FTL are evaporated ahead of FTL closure.
    - Remove Reagents & Solutions.
        - Reagent inventory is summarized below.

Reagent	State	Inventory tons	Duration days
Lime (Ca(OH)2	solid	12	15
Aerophine (AP) 3418A	liquid	0.40	30
Aerofloat 404, aqueous	liquid	0.04	30
Aerofroth 65	liquid	0.40	30
Percol 351	powder	0.20	30
Diesel Fuel	liquid	3.51	30

        - Un-Opened Reagent Containers. Reagents have a high value. Un-opened reagents containers are returned to the vendor or given to other industrial users (or laboratories) that are permitted to have such reagents. All lime - un-opened and opened sacks-will be sold or given away to the nearby concrete batch plant.
        - Opened Reagent Containers. The reagents in opened containers that cannot be accepted by others are;

- Pump reagents from all remaining reagents into conditioning tank ahead of the purging process.
- There is a small amount of chemicals in the laboratory. These chemicals are diluted with water and drained into the Mill Building sump (as is designed), which then report to the reclaim tanks and subsequently purged.
- This activity is complete when all solutions are in the LLCP.
- These activities are performed concurrently with the process purging.

4.2.4 TASK 30 – STRUCTURES & EQUIPMENT

The property is in an area zoned for IM by Lake County and post operation use will remain IM. The crusher building, mill building, and tailings filter building will remain. However, (1) equipment will be removed and either sold for use or scrap and, the (2) the scale house and (3) the concrete drainage troughs will be demolished and moved into the LLCP.

This task only applies to closure scenarios.

POST CLOSURE ACTIVITIES

- Activity 1. Remove Equipment
  - Scale House
    - Scales
  - Crusher Building
    - Hopper
    - Jaw Crusher (if installed)
    - Screen
    - Cone Crusher
    - Conveyors
    - Dust Collector
  - Mill Building
    - Fresh- and Reclaim Water Tanks (4)
    - Ball Mill & Sump (1 unit)
    - MDM Thickener (1)
    - Conditioning Tank (1)
    - Rougher Flotation Tanks (3)
    - Cleaner Flotation Tanks (4)
    - Concentrate Thickener (1)
    - Tailings Thickener (1)
    - Concentrate Filter Press (1)

        - Mine Office and Laboratory Equipment
        - Diesel Storage Tank (1)
    - Tailings Filter Building
        - Drum Filter & Head Tank
- Activity 2. Dismantle Piping & Electrical
    - Electrical in Scale House
    - Piping in Mill Building, and Tailings Filter Building
    - Scale House
    - Crushed ore conveyor to Fine MDM Bin
- Activity 3. Remove Steel Structures
    - Scale House
    - Haul scrap to recyclers
- Activity 4. Remove Concrete
    - Break Concrete
        - Spill Containment Troughs
        - Scale House
    - Place in FTL. Concrete cannot be placed in the FTL until solution has evaporated (see Task 40).
    - Compact concrete.

4.2.5 TASK 40 – FILTERED TAILINGS LANDFILL & LANDFILL LEACHATE COLLECTION POND

The FTL will be used to hold demolished foundation concrete as well as its GCL, leak detection and HDPE liners. The FTL will also hold the LLCP liners. This task will be completed for either temporary cessation or closure. However, only the evaporation activity applies if temporary cessation.

POST CLOSURE ACTIVITIES

- Activity 1. Evaporate Solution
    - This activity will commence as soon as Task 20 is completed. It is the critical path to completing closure since it is dependent on solution evaporation rate.
    - Construct a manifold around the top of the FTL inner embankment to allow water to be sprayed onto the HDPE liner and flow back into the sump.
    - Solution evaporates as it returns to the sump.
    - This process is complete when solution has evaporated, leaving reagents as residue.
- Activity 2. Reclaim FTL & LLCP
    - Dismantle evaporation system place piping in FTL.
    - Remove FTL concrete jersey barriers from property
    - Compact concrete to assure stability
    - Remove Liners from LLCP and place in FTL

- Remove liner anchoring for the liners and leak detection for FTL
- Cut liner along valleys to allow liners to be folded into FTL.
- Backfill LLCP using stockpiled material
- Backfill FTL using embankment material to approximate original contours.

4.2.6 TASK 50 – GRADING, COVER & SEED

The final reclamation step is grading, cover and seeding. This task is completed during any closure condition.

POST-CLOSURE ACTIVITIES

- Activity 1. Grading
  - Overburden Area 2
  - Scale House structure disturbance to approximate original contours
  - Overburden Area 1 and FTL are graded together to approximate original contours.
- Activity 2. Cover with topsoil/SPGM 6-inches thick and Seed
  - Overburden Area 2
  - Scale House disturbance.
  - Overburden Area 1 and FTL.

4.3 SCHEDULE

Post-operation closure activities including timing and the estimated duration is shown in **Table 4-3**.

- Given the harsh winters experienced in the area, and since the exact month operations will end is not known, the schedule accounts for delays/no operations during extreme winter months.
- Historic stockpiles and tailings areas will be removed within 6-months of project start-up
- The schedule provides 30 to 60 days of float for the critical path.

TABLE 4-3: RECLAMATION CLOSURE SCHEDULE

Task	Task Description	Days	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
10	Historic Stockpiles & Tailings	60	>Completed within 6 months of Startup																		
20	MDM, Slurry, Reagents & Solutions	15		> Time accounts for RFQ, award and contractor hire.																	
30	Structures & Equipment	120				>Work starts after Task 20 is complete															
40	Filtered Tailings Landfill & Containment Pond	180							>Work starts after Task 30 is complete and accounts for evaporation												
50	Grading Cover & Seeding	10													>Seeding				>Reseeding		

4.1 RECLAMATION COST ESTIMATE

Process facility reclamation closure costs are estimated to be $164,000 as summarized in **Table 4-4** and shown in **Appendix 4-1**.

TABLE 4-4: RECLAMATION COST ESTIMATE

Task	Reclamation Objective	Rate	Labor Hours	Labor Cost	Equip Rental	Waste Haulage	Materials Cost	Total Cost
10	Histroic Stockpiles & Talings, and Wire Fence		56	$2,140	$600	$250	$163	$3,153
20	MDM, Slurry, Reagent & Solutions		4	$11,200	$0	$700	$0	$11,900
30	Structures & Equipment		848	$50,880	$9,850	$4,250	$0	$64,980
40	Emergency Containment Sump		456	$21,580	$12,100	$960	$4,000	$38,640
60	Grading, Cover & Seeding		90	$4,777	$3,038	$0	$745	$8,559
	Total		**1,454**	**$90,577**	**$25,588**	**$6,160**	**$4,907**	**$127,231**
	Mobilization/Demobilization							$6,000
	Liability Inusrance	2.5%						$3,181
	Performance Bond	1.5%						$1,908
	Contractor Profit	15%						$19,085
	Project Management	5%						$6,362
	Total							**$163,767**

APPENDIX 4-1

RECLAMATION COST ESTIMATE

This is a 4-page Excel file that can be inserted in the PDF version of this document.

5.0 RULE 6.3.4: EXHIBIT E–MAPS

The following maps are provided in this Exhibit:

- **Figure 5-1: Affected Land, Adjacent Owners & Access Roads**
- **Figure 5-2: Soils & Vegetation**
- **Figure 5-3: Features & Structures within 200ft**
- **Figure 5-4: Site Plan**
- **Figure 5-5: Reclamation Plan View**
- **Figure 5-6: Reclamation Cross Section**

Figure 5-1: Affected Land, Adjacent Owners & Access Roads

Figure 5-2: Soils & Vegetation

Figure 5-3: Features & Structures within 200ft

Figure 5-4: Site Plan

Figure 5-5: Reclamation Plan View

Figure 5-6: Reclamation Cross Section

6.0 RULE 6.3.6: EXHIBIT F – OTHER PERMITS & LICENSES

COUNTY PERMITS AND APPROVALS

- Lake County Conditional Use Permit – (Appendix 6-1)

2011 Permit 11-07 is included. This permit once updated will be provided to the Division for review.

- Parkville Water District – (Appendix 6-2)
- Noxious Weed Management Plan- (Appendix 6-3)
- Building Permit- (Appendix 6-4)

Building permits for pre-2026 construction is included. Additional building permits for; crusher building, truck scale, and filtration building will be provided to the Division for review, when received.

- Certificate of Occupancy (CO) (Appendix 6-5)

CO for pre-2026 construction is included. Additional CO's for; crusher building, truck scale, and filtration building will be provided to the Division for review, when received.

STATE PERMITS AND APPROVALS

- Air Pollution Emission Notice (APEN) - CDPHE; (Appendix 6-6)

APENs have been submitted to the Colorado Department of Public Health & Environment (CDPHE) and will be provided when received.

- Stormwater Permit Application (SWMP) - CDPHE; (Appendix 6-7)

SWMP has been submitted to the Colorado Department of Public Health & Environment (CDPHE) and will be provided when received

- State Historic Preservation Office Consultation (Appendix 6-8)
- Road Access Permit – CDOT; (Appendix 6-9)
- Colorado State Engineer-Monitoring Well Permits; (Appendix 6-10)
- Stormwater Permit Leadville Mill; (Exhibit U).
- US Army Corps of Engineers; (Appendix 6-11)

The Mill is a "no discharge facility".

APPENDIX 6-1

LAKE COUNTY
- CONDITIONAL USE PERMIT

Insert Appendix 13-1

4 Pages

This should have the old permit for now (already in). The New CUP will be added when approved by Lake County.

APPENDIX 6-2

PARKVILLE WATER DISTRICT
- COMMITMENT TO PROVIDE WATER

Insert Appendix 13-2

1 page

This is done. Use letter from Parkville Water District

APPENDIX 6-3

LAKE COUNTY

- NOXIOUS WEED MANAGEMENT PLAN

Insert Appendix 13-3 27 pages

APPENDIX 6-4

LAKE COUNTY
- BUILDING PERMIT

Insert Appendix 13-4

14 Pages

Include old building permits. We will include new permits once we receive them.

APPENDIX 6-5

LAKE COUNTY

- CERTIFICATE OF OCCUPANCY

Insert Appendix 13-5

5 Pages

This should have the old Cos for now (already in). the New Cos will be added when approved by Lake County

Appendix 6-6

CO Dept. of Public Health & Environment - Air Pollution Emission Notice (APEN)

Needs to be updated NICK

Insert Appendix 13-6

8 Pages

This should have the old APENs for not (already in). The New APENs will be added when approved by Lake County.

APPENDIX 6-7

CO DEPT. OF PUBLIC HEALTH & ENVIRONMENT - STORMWATER PERMIT APPLICATION

13 pages

APPENDIX 6-8

STATE HISTORIC PRESERVATION OFFICE - CONSULTATION

Insert Appendix 13-9

1 page

APPENDIX 6-9

COLORADO DEPARTMENT OF TRANSPORTATION - HIGHWAY ACCESS PERMIT

According to a phone call with Brian Killian at the Colorado Department of Transportation on January 14th 2020, the access permit transfers with the land as long as the land use remains the same. Same requirements stated in the permit apply to the new landowner.

11 pages

APPENDIX 6-10

COLORADO STATE ENGINEER
- MONITORING WELL PERMITS

Insert Appendix 7-11

10 Pages

APPENDIX 6-11

US ARMY CORPS OF ENGINEERS
- APPROVED JURISDICTIONAL DETERMINATION

2 pages

7.0 RULE 6.3.7: EXHIBIT G – SOURCE OF LEGAL RIGHT TO ENTER

CJK Milling Company is the owner of the Mill property, buildings, and equipment, whereas, Union Milling Contractors, LLC (UMC) will be the operator. The following appendices include:

- **Appendix 7-1**: Warranty Deed,
- **Appendix 7-2**: Right of Way Agreement; and
- **Appendix 7-3**: Authorized Legal Right to Enter.

APPENDIX 7-1

LEGAL RIGHT TO ENTER
- WARRANTY DEED

Insert Appendix 14-1

1 Page

APPENDIX 7-2

LEGAL RIGHT TO ENTER

- RIGHT OF WAY EASEMENT

Insert Appendix 14-2

6 Pages

APPENDIX 7-3

LEGAL RIGHT TO ENTER

- AUTHORIZED LEGAL RIGHT TO ENTER

Insert Appendix 14-3

1 Page

8.0 RULE 6.3.8: EXHIBIT H – MUNICIPALITIES WITHIN 2 MILES

Leadville Colorado is a municipality located West of the Mill and within 2 miles of the permit boundary.

Contact:

Anne Schneider
Community Planning & Development
505 Harrison Ave
P.O. Box 513
Leadville, CO 80461
719-486-4112
aschneider@co.lake.co.us

9.0 RULE 6.3.9: EXHIBIT I – PROOF OF FILING W/ COUNTY CLERK & RECORDER

See proof of permit submittal to the Lake County Clerk and Recorder in **Appendix 9-1**.

APPENDIX 9-1

PROOF OF FILING

- LAKE COUNTY CLERK AND RECORDER

Insert Appendix 18-1

1 Page

10.0 RULE 6.3.10: EXHIBIT J – PROOF OF MAILING OF NOTICES TO BOARD OF COUNTY COMMISSIONERS AND CONSERVATION DISTRICT

See proof of mailing of Notice to Lake County Commissioners in **Appendix 10-1** and Soil Conservation District in **Appendix 10-2**.

APPENDIX 10-1

PROOF OF NOTICE

- LAKE COUNTY BOARD OF COMMISSIONERS

Insert Board of County Commissioners Proof of notice

1 page

APPENDIX 10-2

PROOF OF NOTICE

- LAKE COUNTY CONSERVATION DISTRICT

Insert Lake County Conservation District Proof Of Notice

1 page

11.0 RULE 6.3.11: EXHIBIT K – RESERVED

12.0 RULE 6.3.12: EXHIBIT L – PERMANENT MAN-MADE STRUCTURES

Figure 5-3 illustrates the location of all man-made structures. Structures and owners are listed in **Table 12-1**.

TABLE 12-1: STRUCTURES WITHIN 200FT

Owners	Structures	Utilities
Benson	Access Road	-
Dara/Fullone	Access Road	-
Woods	Access Road	-
Phillips	Access Road	-
Leadville Sanitation	Fence Finishing Pond	Sewer Line
Xcel	-	Powerline Gas Line

See **Appendix 12-1 through Appendix 12-5** for Structural Agreements.

See **Appendix 12-6** for Utility Letter.

See **Appendix 12-7** for Engineering Report.

APPENDIX 12-1

PERMANENT MAN-MADE STRUCTURES

LEADVILLE SANITATION

7 pages

APPENDIX 12-2

PERMANENT MAN-MADE STRUCTURES

CONCERNED CITIZENS

BENSON

11 pages

APPENDIX 12-3

PERMANENT MAN-MADE STRUCTURES

PHILLIPS

5 pages

APPENDIX 12-4

PERMANENT MAN-MADE STRUCTURES

DARA/FULLONE

5 pages

APPENDIX 12-5

PERMANENT MAN-MADE STRUCTURES

WOODS

5 pages

APPENDIX 12-6

UTILITY LETTER

XCEL

This is 5 pages

APPENDIX 12-7

ENGINEERING REPORT

Engineering Report(s) will be submitted applicably after structural agreement responses have been received.

13.0 RULE 6.4.21: EXHIBIT U – DESIGNATED MINING OPERATION ENVIRONMENTAL PROTECTION PLAN

13.1 THE ENVIRONMENTAL PROTECTION PLAN

This section describes the procedures and containment strategies by which the Mill will protect human health and the environment. On November 23, 2011 CDRMS listed the Leadville Mill as "Designated Mining Operation" (DMO). The DMO regulations require the preparation of an Emergency Response and Management Plan and an Environmental Protection Plan (EPP).

The purpose of the plan is to establish the general elements and organization of emergency response plans and to set guidelines to manage designated chemicals.

The DMO designation requires an operator using chemicals such as xanthates to prepare safety, chemical and containment management plans outlining the use, storage, handling, and disposal of chemicals.

The milling process and waste management plans Dry Tailings Landfill (DTL) and Landfill Leachate Collection Pond (LLCP) have been specifically designed with features to minimize the use of chemicals and to maximize water conservation and recycling, highlighted by:

- Managing and minimizing chemical uses,
- Implementing "best management" water recycling technologies,
- Managing and maintaining the DTL and LLCP containment structures,
- Constructing and maintaining chemical secondary containment barriers,
- Adopting good housekeeping practices; and
- Implementing and maintaining process and environmental monitoring programs.

13.2 MAPS

A comprehensive set of drawings and general arrangements were prepared to support required elements of the EPP and include:

- **Figure 5-4**: Mill Site Plan
- **Figure 3-1** through **Figure 3-10**: Process Flowsheets
- **Figure 5-5**: Reclamation Plan and Sections
- **Figure 3-11** through **Figure 3-15**: DTL and LLCP Details

13.3 IDENTIFICATION OF OTHER AGENCIES' ENVIRONMENTAL PROTECTION MEASURES & MONITORING

A Stormwater Management Plan (SWMP) was submitted by CJK to the Colorado Department of Health and Environment (CDPHE) Stormwater Management Plan (SWMP) in 2023. The plan was accepted as complete in August, 2025 and the statutory public comment period on the plan was completed on November 8, 2025 and is now under final review by CDPHE.

Stormwater controls will be inspected bi-weekly or after significant rainfall events during construction and monthly thereafter. When necessary, non-functioning control structures will be repaired. Stormwater water quality samples will be obtained on an event-based collection protocol, and water quality results will be reported pursuant to permit terms. The Mill will operate as a "**zero - discharge**" facility in terms of pollutant discharge off-site, meaning that during operations, the only potential off-site discharges to surface water will be sediment from controlled and undisturbed parts of the mill site property. Consistent with this designation, a CDPHE point discharge permit and a USEPA NPDES permit are not required.

The Mill permit area does not have riparian or wetlands designated areas.

13.4 OTHER PERMITS AND LICENSES

13.4.1 *LIST OF PERMITS, LICENSES & OTHER FORMAL AUTHORIZATIONS*

TABLE 13-1: PERMITS, LICENSES & OTHER FORMAL AUTHORIZATIONS

AGENCY	PERMIT/LICENSE/APPROVAL	STATUS
CDRMS	Mine Permit	Active, M1990-057
CDPHE	General Stormwater Permit for Metal Mining	Submitted
CDPHE	Construction Stormwater Permit	Submitted
CDPHE	Industrial Discharge Individual Permit	Not Req.- Non-Discharge Facility
CDPHE	Air Quality Permit	In Process
MSHA	Mill ID: 0504992	Inactive. Reactivate upon M1990-057 112 Amendment submission
Lake Co	Conditional Use Permit	CUP No. 11-07 Active. New CUP process upon M1990-057 112 Amendment submission

13.4.2 LOCATION OF PERMITS, LICENSES OR OTHER FORMAL AUTHORIZATION

Table 13-2 lists where permit documents can be obtained.

TABLE 13-2: PERMITS, LICENSES & OTHER FORMAL AUTHORIZATIONS

Authorizations/Agency	Permit/License	Location
CDPHE-Water Quality Division	Stormwater Discharge Permit	Mill office & CJK's files
CDPHE-Water Quality Division	Industrial Permit Discharge Permit	Not Required-"zero discharge" facility
CDPHE-Air Quality Division	Air Quality Permit	Mill office & CJK's files
CDPHE- Air Quality Division	Air Quality Certificate of Designation	Not Required
State Historical Preservation Office	Notification-Filed	Mill office & CJK's files
CDOT	Highway Access Permit	Mill office & CJK's files
Lake County	Conditional Use Permit	Mill office & CJK's files
Lake County	Construction Permit	Mill office & CJK's files
Lake County	Certificate of Occupancy	Mill office & CJK's files
Lake County	Noxious Weed Management Plan	Mill office & CJK's files
Parkville Water District	Water Supply Agreement	Mill office & CJK's files

13.4.3 ADDITIONAL PERMITS

Copies of new or renewed facility permits will be sent to CDRMS within 30 days of receipt and kept on file within the Mill office.

13.4.4 COMPLIANCE

The Mill will be operated in compliance with all applicable County, State and Federal regulations.

13.5 DESIGNATED CHEMICAL(S) EVALUATION

13.5.1 POTENTIAL TO AFFECT HUMAN HEALTH, PROPERTY, OR ENVIRONMENT

Listed process chemicals will be managed in accordance with MSHA requirements and as suggested, in the Material Safety Data Sheets (MSDS) shown in **Appendix 13-**1. A chemical summary which may have the potential to affect human health and the environment is presented in **Table 13-3**.

TABLE 13-3: DESIGNATED & OTHER STORED CHEMICAL(S)

Lime		
Chemical Name	Calcium Oxide	
Trade or Other Names	NA	
Use		
Type (Dry/Liquid)	Dry	
CAS No.	1305-62-0	
Human Health Hazards	Inhalation: Skin: Eyes:	May cause respiratory irritation Causes skin irritation Causes serious eye damage
Environmental Impacts	Control and minimize releases to watercourses and storm drains. Notify Environmental agencies of significant spillage into water.	
PPE Required	Eye: Hand: Skin: Footwear: Respiratory:	ANSI, CSA or ATM approved glasses with side-shields. Wear dry protective gloves. Cover skin to minimize direct contact. Boots resistant to alkaline material. Use NIOSH/MSHA approved respirators if exposure threshold limits are exceeded, or irritation is experienced.
NFPA Classifications	Health: 3 Flammability: 0 Instability: 1	
Corrosiveness	Corrosive to Skin and Eyes	
pH	12.45	
Incompatible Materials	Water, strong acids, phosphorus, malefic anhydride, nitro methane, nitro ethane, nitro-paraffins, nitro propane, boron tri-fluoride, chlorine tri-fluoride, ethanol, fluorine, hydrogen fluoride, phosphorous pent oxide some metals, CO2.	
Aerophine 3418A		
Chemical Name	Sodium Di(isobutyl)dithiophosphinate	
Trade or Other Names	Sodium Di(isobutyl)dithiophosphinate,aerophine 3418A	
Use	For R&D use only. Not for medicinal, household or other use	
Type (Dry/Liquid)	Dry	
CAS No.	13360-78-6	
Human Health Hazards	Inhalation: Ingestion: Skin: Eye:	Move the victim into fresh air. If breathing is difficult, give oxygen. If not breathing, give artificial respiration and consult a doctor immediately. Do not use mouth to mouth resuscitation if the victim ingested or inhaled the chemical. Fatal if swallowed Rinse mouth with water. Do not induce vomiting. Never give anything by mouth to an unconscious person. Call a doctor or Poison Control Center immediately. Take off contaminated clothing immediately. Wash off with soap and plenty of water. Consult a doctor. Rinse with pure water for at least 15 minutes. Consult a doctor.
Environmental Impacts	Prevent further spillage or leakage if it is safe to do so. Do not let the chemical enter drains. Discharge into the environment must be avoided.	
PPE Required	Eye: Hand & Skin: Respiratory:	Wear tightly fitting safety goggles with side-shields conforming to EN 166(EU) or NIOSH (US). Wear fire/flame resistant and impervious clothing. Handle with gloves. Gloves must be inspected prior to use. Wash and dry hands. The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it. If the exposure limits are exceeded, irritation or other symptoms are experienced, use a full-face respirator.
NFPA Classifications	Health: 2 Flammability: 1 Instability: 0 Physical Hazards: NA	
Corrosiveness	No Data Available	
pH	No Data Available	
Incompatible Materials	No Data Available	

Aerofloat 404			
Chemical Name	AERO 404 Promoter, Aqueous		
Trade or Other Names	None		
Use			
Type (Dry/Liquid)	Liquid		
CAS No.	33619-92-0, 2492-26-4		
Human Health Hazards		Inhalation:	Remove to fresh air. If breathing is difficult, give oxygen. Apply artificial respiration if patient is not breathing. Obtain medical attention immediately. If swallowed, call a physician immediately. Only induce vomiting at the instruction of a physician. Never give anything by mouth to an unconscious person.
		Ingestion:	If swallowed, call a physician immediately. Only induce vomiting at the instruction of a physician. Never give anything by mouth to an unconscious person.
		Eyes:	Rinse immediately with plenty of water for at least 15 minutes. Obtain medical attention Immediately.
		Skin:	Remove contaminated clothing and shoes without delay. Wear impermeable gloves. Wash immediately with plenty of water and soap. Pay particular attention to skin crevices, nail folds, etc. Do not reuse contaminated clothing without laundering. Do not reuse contaminated leatherware. Obtain medical attention.
Environmental Impacts	Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. The ecological assessment for this material is based on an evaluation of its components.		
PPE Required		Eye:	Prevent eye and skin contact. Provide eye wash fountain and safety shower in close proximity to points of potential exposure. Wear eye/face protection such as chemical splash proof goggles or face shield. Choose body protection according to the amount and concentration of the dangerous substance at the work place.
		Skin:	Prevent contamination of skin or clothing when removing protective equipment. Wear impermeable gloves and suitable protective clothing.
		Respiratory:	For operations where inhalation exposure can occur, use an approved respirator recommended by an industrial hygienist after an evaluation of the operation. Where inhalation exposure can not occur, no respiratory protection is required. A full facepiece respirator also provides eye and face protection.
NFPA Classifications	Health: 3 Flammability: 1 Instability: 0		
Corrosiveness	Corrosive		
pH	11-12		
Incompatible Materials	Contact with acid, or acidic material such as alum, liberates hydrogen sulfide. **Hazardous Decomposition Products:** Carbon monoxide (CO)**,** Carbon dioxideoxides of sulfur (includes sulfur di and tri oxides)**,** hydrogen sulfide (H2S)**,** oxides of phosphorus		
AEROFROTH 65 Frother			
Chemical Name	Aerofroth 65 Frother		
Trade or Other Names			
Use			
Type (Dry/Liquid)	Liquid		
CAS No.	NA		
Human Health Hazards		Inhalation:	Material is not expected to be harmful if inhaled. Remove to fresh air.
		Ingestion:	Material is not expected to be harmful by ingestion. No specific first aid measures are required.
		Eyes:	Rinse immediately with plenty of water for at least 15 minutes.
		Skin:	Wash immediately with plenty of water and soap.
Environmental Impacts	This material is not classified as dangerous for the environment. This material is readily biodegradable.		
PPE Required		Eye:	Wear eye/face protection such as chemical splash proof goggles or face shield.
		Hand:	Avoid skin contact. Wear impermeable gloves.
		Respiratory:	For operations where inhalation exposure can occur, use an approved respirator recommended by an industrial hygienist after an evaluation of the operation. Where inhalation exposure cannot occur, no respiratory protection is required.
NFPA Classifications	Health: 1 Flammability: 1 Instability: 0		
Corrosiveness	NA		
pH	7.0- 10.0(5% aqueous solution)		
Incompatible Materials	No specific incompatibility		

Percol 351		
Chemical Name	Percol 351	
Trade or Other Names		
Use		
Type (Dry/Liquid)	Dry, Granular Powder	
CAS No.	9003-05-8	
Human Health Hazards	Inhalation:	Remove to fresh air, if not breathing give artificial respiration. If breathing is difficult, give oxygen and get immediate medical attention.
	Ingestion:	Do not induce vomiting. If vomiting occurs naturally, have casualty lean forward to reduce the risk of aspiration. Seek medical attention immediately.
	Eyes:	Flush the eye(s) with lukewarm, gently flowing water for 5-10 minutes or until the chemical is removed. Get medical attention if irritation persists.
	Skin:	Wash off immediately with soap and plenty of water. Get medical attention if irritation occurs. If clothing is contaminated, remove and launder before reuse.
Environmental Impacts	Product not considered toxic to aquatic organisms.	
PPE Required	Eye:	Wear safety glasses or goggles to protect against dust particles
	Hand:	Wear chemical resistant gloves and protective clothing..
	Respiratory:	Use NIOSH approved respirator as needed to mitigate exposure..
NFPA Classifications	Health: 0 Flammability: 1 Instability: 0 Physical Hazards: 0	
Corrosiveness	NA	
pH	Not Determined	
Incompatible Materials	Strong oxidizing agents. (may degrade polymer)	

Hydrochloric Acid		
Chemical Name	Hydrochloric Acid, ACS	
Trade or Other Names		
Use		
Type (Dry/Liquid)	Liquid	
CAS No.	7647-01-0	
Human Health Hazards	Inhalation:	May cause respiratory irritation.
	Ingestion:	
	Eyes:	Causes eye damage.
	Skin:	Causes severe skin burns.
Environmental Impacts	Should not be released into environment. Prevent from reaching drains, sewer, or waterway.	
PPE Required	Eye:	Face shield (8in minimum). tightly fitting safety goggles.
	Hand:	Select glove material impermeable and resistant to the substance.
	Skin:	Wear protective clothing.
	Respiratory:	Not required under normal conditions of use. Where risk assessment shows air-purifying respirators are appropriate use full-face particle respiratory type N100 respirator cartridges as back up to engineering controls. When necessary NOISH approved breathing equipment.
NFPA Classifications	Health: 3 Flammability: 0 Reactivity: 1 Physical Hazards: 1	
Corrosiveness	Corrosive to metals(category 1) and skin(category 1B).	
pH	<1	
Incompatible Materials	Bases, Amines, Alkali metals, Metals, permanganates (potassium permanganate), Flourine, Metal acetylides, Hexalithium disilicide.	

Diesel		
Chemical Name	Diesel Fuel	
Trade or Other Names	Automotive diesel	
Use		
Type (Dry/Liquid)	Liquid	
CAS No.	68334-30-5	
Human Health Hazards	Inhalation: Ingestion: Eyes: Skin:	Harmful if inhaled May be fatal if swallowed. Cause eye irritation. Causes skin irritation.
Environmental Impacts	Prevent entry into waterways, sewers, basements or confined areas.	
PPE Required	Eye: Hand: Skin: Respiratory:	If contact is likely, safety glasses with side shields are recommended. Chemical resistant gloves are recommended. Chemical/oil resistant clothing is recommended.
NFPA Classifications	Health: 1 Flammability: 2 Reactivity: 0 Physical Hazards:	
Corrosiveness	Corrosive to skin.	
pH	Not technically feasible	
Incompatible Materials	Halogens, Strong Acids, Strong Bases, Strong Oxidizers.	

13.5.2 EXPECTED CONCENTRATIONS, PROCESS SOLUTION VOLUMES & FATE

The estimated amount of chemicals to be used per ton of ore is discussed in Section 3.2.1. Approximately 0.24 tons of water (9.26tph feed @ 2.18tph required make-up water) will be used for every ton of ore milled. The annual estimated amount of chemicals and water usage is summarized in **Table 13-4** and **Table 13-5**. **Table 13-6** is a cross reference of flow mass and rate of all circulating chemical constituents.

TABLE 13-4: FLOTATION REAGENT CONSUMPTION

Reagent	Unit Rate (lb/t)	Daily (lbs)	Monthly (lbs)
Water	**0.24**	**47**	**1,432**
Lime, pH	3.6	726	**100**
AP3418A, Promoter	0.11	22	670
AP404, Promoter	0.11	22	670
AF65, Frother	0.04	9	268
Percol,	0.03	7	201

(1) Bold values are in tons

TABLE 13-5: OTHER REAGENTS CONSUMPTION

Reagent	Daily (gallons)	Monthly Gallons
Diesel Fuel	20	608
Gasoline	2	61

TABLE 13-6: REAGENT QUANTITIES IN PLANT PROCESS

Mech Equip No	Flow Sheet Ref	Process Equipment	Solid: Soln Ratio	% solids	Total Volume (ft3)	Ton Solids	Ton Water	Gal Water	Lime (lbs)	AP 3418A (lbs)	AP 404 (lbs)	AF 65 (lbs)	Percol 351 (lbs)
1	1	MDM Bin	2.70	96%	2,968	240	10	2,397	1,920	0	0	0	0
1	1-2	Ball Mill	0.31	77%	31	0.2	1	180	2	0	0	0	0
2	3-4-7	Cyclone	1.51	40%	-	-	-	-	-	-	-	-	-
3	4-5	Gravity Concentrator	1.41	42%	-	-	-	-	-	-	-	-	-
4	7-8	Feed Thickener Tank	2.08	33%	760	16	8	1,847	128	0	0	0	0
5	8	Conditioner Tank	1.86	35%	75	2	1	197	12	0.16	0.16	0.07	0.05
6	8-10	Rougher Flotation Tanks	1.51	40%	1,039	19	13	3,096	156	2.09	2.09	0.83	0.63
7	9-13-14	Cleaner Flotation Tanks	5.67	15%	346	9	2	388	73	0.98	0.98	0.39	0.29
8	13-15	Concentrate Thickener	1.67	38%	113	2	1	317	18	0.24	0.24	0.09	0.07
9	15-17	Concentrate Filter	0.43	70%	12	0	0	65	1	0.01	0.01	0.00	0.00
10	20-21	Tailings Thickener Tank	1.16	46%	352	6	5	1,221	47	0.63	0.63	0.25	0.19
11	21-23	Tailings Filter	0.43	70%	372	3	8	1,947	28	0.37	0.37	0.15	0.11
12	15-17	Concentrate Filter	0.43	70%	37	0	1	194	3	0.04	0.04	0.01	0.01
13	26-28	Reclaim Water Tank	-	0%	545	0	17	4,075	0	0.00	0.00	0.00	0.00
14	-	Fresh Water Tanks	-	0%	1,378	0	43	10,303	0	0.00	0.00	0.00	0.00
		TOTAL			**8,029**	**298**	**109**	**26,227**	**2,388**	**4.52**	**4.52**	**1.81**	**1.36**

13.5.3 MSDS

MSDS sheets for all chemical reagents are provided in **Appendix 13-1**.

13.6 DESIGNATED CHEMICALS & MATERIALS HANDLING

13.6.1 PROCEDURES FOR DISPOSAL, DECOM., STABILIZATION

Process chemicals will be consumptively used during the milling process. The dewatered tailings that are placed in the DTL will contain minor trace chemicals and residual metals typical of flotation tailings from the processing of sulfide ores. Upon cessation of operations, remaining process chemicals will be disposed offsite in a federally licensed facility. Tailings Management is discussed in detail in **Section 3.5**. Other disposal management activities, if required, will be subject to a CDRMS Technical Revision (TR) prior to implementation.

13.6.2 NARRATIVE DESCRIPTION

- Chemicals are handled and stored in accordance with SDS and federal, State, and county regulations. Details of the reagent-specific delivery and handling protocols are provided in **Section 3.5.5**. Specifically, for this operation, this includes the following:

  - Chemicals are transported to their designated storage location via vehicle and unloaded by forklift or manually,
  - Chemical storage locations is locked and secured during non-operating hours or during periods of cessation,
  - Mill personnel is trained appropriately in the proper storage and use of site-specific chemicals during the milling operation,
  - Chemicals used in the milling operation are only be used in the Mill,
  - Chemicals will be disposed of properly upon Mill closure.
- RoM material that is in active processing, including course ore bin through thickeners and filter presses, iscleaned out per standard operation procedures (SOPs).
- Liquid reagents in piping is manually drained into buckets or pumped back in their barrels and disposed in accordance with applicable federal, State and county regulations.
- Once material in the system is processed, remaining process water will be pumped through the system to clean pipes, tanks, thickeners, and filter equipment. This water will then be stored in the LCCP for recycle to process.
- During temporary cessation, liquid reagents and lubricants are kept in their original barrels/overpack containers, and solid reagents in their bags. Inventory will remain in a secured area within the Mill building.
- Diesel fuel is kept in a 1,00-gallon double lined tank.
- Gasoline is be kept in a pickup truck transfer tank.
- During closure, reagents are either sold, recycled, or disposed of at an approved facility.
- Lubricants are recycled at an approved facility.
- Received RoM are initially placed in the ore receiving bunkers. The bunkers are covered to eliminate or greatly reduce any collection of direct precipitation or snowmelt. The floor of the ore bunkers is sloped inward to create a containment sump that provides adequate resident storage of any incidental ore drain down contact waters. The bunkers are designed to allow easy access by scoop loaders for transfer to the mill via covered conveyor and providing containment of any potential ore contact water from entering the environment.
- Tailings (processing residues) are filtered and placed mechanically in the DTL as described in **Section 3.5**.

The following measures will be taken to prevent off-site impacts:

- Prior to processing, stockpiled ore is placed on an impermeable concrete pad.
- The pad is covered and protected on three sides.
- Limited quantities of designated chemicals are used in the Mill at any given time.
- The mill building is designed to contain spills. Spill prevention measures include concrete floors and over-liners for liquid chemical storage within the storage and processing areas.
- Liquid chemical is stored in designated areas in 55-gallon over-packs barrels.
- A mill sump contains spills within the Mill building. If a spill breaches the Mill building the LLCP will provide containment via a concrete transfer trench that passed beneath the tailings thickener into the LLCP.
- Environmental water, air and mine waste monitoring and maintenance programs are active during and following closure.

13.7 FACILITIES EVALUATION

13.7.1 SITE SPECIFIC CONDITIONS

The following site-specific environmental protection SOPs will be managed by the Mill manager:

- Small quantities of designated chemicals are used at any given time.
- Chemicals (reagents) are stored in the Mill in secondary spill containment structures.
- Within the permit area the depth to groundwater is greater than 60-feet below ground surface which provides a depth to minimize spills affecting groundwater quality. (Colorado State Engineers, Ground Water Section, (1990)
- Tailings have a low moisture holding capacity (<25%) and the existing DTL liner system and retro-fit underdrainage systems were designed to prevent process water from impacts to local groundwater and surface waters.
- Up and down-gradient wells from the Mill are installed and sampled since 2014 and is sampled quarterly. Well sampling provides water quality background and operating information to determine if water quality changes have occurred during Mill operation. In addition, 4 surface water sampling sites are established as approved by CDRMS for waters within 2 miles of the Mill

property. These locations are shown on **Figure 5-4** and include two locations upgradient and downgradient of the Mill site on California Gulch, and two locations on the Arkansas River upgradient and downgradient of the confluence of California Gulch. Details are provided in **Section 13-10**.

13.7.2 DESIGNATED AND OTHER CHEMICALS

Designated chemicals and other consumed chemicals during the milling process are summarized in **Tables 13-3** through **Table 13-7**.

13.7.3 ALTERATION TO NATURALLY OCCURRING GEO. & GEOCHEM. CONDITIONS

The Mill will not alter natural geological or affect geochemical conditions at the facility. Only MDM material meeting mill acceptance criteria will be processed. As discussed in **Section 3.5**, the existing temporary ore stockpiles were characterized through a comprehensive sampling and analysis program completed in December 2024 and included basic geochemistry and leachate testing under SPLP protocols. Without exception, the materials met Colorado standards for groundwater and surface water protection. Regardless, these stockpiles will be processed in the early stages of operations and the current footprint areas restored to natural ground condition lines and grades.

13.7.4 MONITORING SYSTEMS

The DTL sump that is part of the Leachate Collection and Recovery System (LCRS) that incorporates a 4-in.-dia. PVC monitoring well that will be periodically sampled. In the unlikely event water is encountered, a sample will be collected and analyzed. The analytical data will be used to determine the potential source of the sample. A technical report will be submitted to CDRMS summarizing technical findings and recommendations.

Water runoff (contact water) from inside the lined area of the DTL will flow into and be captured in the geocomposite drainage blanket, collection pipework network and sump as described in **Section 3.5**. Sensors on the sump pump will be set to recover fluid once a one foot of head is recorded. The system will function continuously to remove collected fluids until the one-foot maximum head limit has been reached. Fluids are pumped from the underdrain sump directly into the Landfill Leachate Collection Pond (LLCP) for recycle to the process plant. See **Figures 3-11** through **Figure 3-15** for design details of the underdrain collection system and LLCP**. Section 3.**5 also includes detailed operational discussions for the placement and management of dry tailings and fluids within the DTL. Dry tailings are delivered to the DTL via conveyor form the tailings Filter plant. Filtrate recovered from the dewatering operations of the drum filter are collected and flow directly by gravity into the LLCP for recycle. Recycled solutions from the LLCP will be periodically sampled for process-related quality control.

Surface water will continue to be sampled on an event basis at Outfalls No.1 and No.2. The event-based protocol is appropriate given the fact that only very large storms (in excess of the 100-yr/24-hr. events) are likely to produce any measurable surface flows other than rapidly absorbed sheet flows. This position has been validated through decades of surveillance of the site during major precipitation and snowmelt conditions.

The Mill has secondary and tertiary containment features as discussed in **Section 3.4**.

The surface and groundwater water sampling results will be submitted to CDRMS quarterly as outlined in the Surface and Groundwater Sampling and Analysis Plan (SAP), described later in this section and provided in full as **Appendix 13-2**. If chemical spills occur outside of the containment structures, emergency response activities will be initiated per the Emergency Response and Management Plan. Grab samples of the affected media will be obtained within 24hr of occurrence and sent to a laboratory for analysis. An analytical spill response data sheet will be sent to CDRMS within 14 days of receipt of laboratory results.

13.7.5 CHEMICALS MANAGEMENT

Liquid chemical drums are contained in secondary containment units capable of storing 150% of the volume being stored. Solid chemicals are stored within the concrete-lined Mill building.

In the event of a spill within Mill building, immediate action will be undertaken to contain and clean the affected areas. Contaminated debris and fluids will be placed in the FTL.

Spill response kits are collocated in the chemical storage area and in the mill processing complex.

13.7.6 SIZE OF CONTAINMENT FACILITY

As described in **Section 3.4.5**, the Mill building and flotation and gravity recovery circuits will each have emergency containment capabilities. Notwithstanding this, the LLCP will at all times have an excess available live storage of approximately 50,000 gallons, and will store all solutions under an extreme and highly-unlikely simultaneous combination of catastrophic events leading to the drain down of all process solutions in the plant. The LLCP has a design capacity of 200,000 gallons, and is expected to operate at a nominal 50% capacity during routine operations, leaving substantial excess freeboard to store solutions from any combination of events. This general program and protocol provides for operation of the facility with ***zero-discharge performance*** in terms of affected process and contact water management.

13.8 GROUNDWATER INFORMATION

13.8.1 MAP(S)

Figure 5-4 shows wells and **Figure 5-3** shows surface water features within 2 miles of the Mill. Sampling of these surface waters are part of the protocols in the SAP (**Appendix 13-2**). Domestic and industrial well owners are listed in **Appendix 13-3**.

13.8.2 FRACTURE SYSTEM WITH RESPECT TO FACILITIES

Water information is discussed in **Section 3.5**. Mill area geological bedrock fractures and faults have not been mapped because the basement rock is covered by unconsolidated alluvial sands, gravels, and soils at least 80-feet thick.

13.8.3 GEOLOGIC MEDIA BENEATH FACILITIES

Geology is discussed in **Section 2.2.1** and soils are discussed in Section **2.2.3**.

13.8.4 POTENTIAL IMPACTS TO SURFACE AND GROUNDWATER

Mill area geological bedrock fractures and faults have not been mapped because the basement rock is covered by unconsolidated alluvial sands, gravels, and soils at least 80-feet thick.

13.8.5 HYDROGEOLOGY

Hydrogeology is discussed **in Section 2.5**.

13.9 GROUNDWATER QUALITY DATA

Two groundwater monitoring wells fitted with pumps were installed in 2014 and quarterly sampled since. Monitoring well LMMW-2 (Permit 295655) is a downgradient well which serves as the Mill's groundwater point compliance well. The upgradient well LMMW-3 (Permit 295654) serves as a regional upgradient background water quality sampling point. In addition, historic well MA1TWM-4 serves as the upgradient monitoring well and PZ-2 serves as a cross-gradient monitoring well.

13.9.1 DOWN-GRADIENT GROUNDWATER USERS

As reported by the office of the State Engineer, there are 510 domestic wells within a 2-mile radius of the Mill, as shown in **Figure 13-1**. The light red shaded background in this figure indicates potentially contaminated groundwater as reported by the Colorado Department of Water Resources. There are 11 wells located approximately 0.5 miles from the Mill; eight are domestic, two are EPA monitoring wells and one is an industrial well. These wells are listed below in **Table 13-5**.

Groundwater flows from the northeast to the southwest towards California Gulch at a rate of approximately 1.0 to 14 feet per day.

TABLE 13-7: WATER WELL INFORMATION

No.	Hole ID[1]	Type[2]	1/4, 1/4, Section	Owner	Latitude	Longitude[2]	Distance (ft)[3]	Location
1	DW01	Domestic	NW, NE, 33	Wood	39.2290775	-106.3346511	450	Down Gradie
2	DW02	Domestic	SW, SE, 28	Benson	39.2326040	-106.3363120	850	Up Gradient
3	DW03	Domestic	NE, NE, 33	Stapleton	39.2281441	-106.3311845	475	Down Gradie
4	DW04	Domestic	SE, NE, 28	Haynes	39.2393530	-106.3303940	3,100	Up Gradient
5	DW05	Domestic	NE, SW, 28	Smith	39.2371320	-106.3402510	2,970	Up Gradient
6	DW06	Domestic	SW, SW, 28	Eaton	39.2318080	-106.3451880	3,350	Up Gradient
7	DW07	Domestic	NE, NW, 33	Flank Oil Co	39.2264430	-106.3384462	1,850	Down Gradie
8	DW08	Domestic	SE, NW, 33	Molleur	39.2236431	-106.3402349	2,900	Down Gradie
9	EPA01	Monitoring	NW, NW, 33	EPA*	-	-	1,300	Down Gradie
10	EPA02	Monitoring	NE, SW, 27	EPA*	-	-	1,990	Down Gradie
11	IW01	Industrial	NE, SW, 27	Diedrich	39.2354140	-106.3218730	2,925	Up Gradient

Figure 13-1: Groundwater Wells within 2mi of Mill

13.9.2 GROUNDWATER QUALITY DATA

Groundwater monitoring data for five quarterly sampling events ending in Q3 of 2025 are presented in **Appendix 13-4**. Q4 sampling has been completed at the time of this initial submittal of this application amendment, with results expected in early January 2026. With the inclusion of these new test results, data for a total of 6 consecutive

13.9.3 GROUNDWATER QUALITY PARAMETERS

Groundwater quality parameters are listed in **Table 13-8** and reported in micrograms per milliliter (µ/ml). This parameter list has been reviewed and approved by CDRMS in 2024.

TABLE 13-8: WATER WELL INFORMATION

Analyte	Table Value Standard (mg/L, unless other units given)	Reg. 41 Table Reference (1-4)
pH Field (pH unit)	6.50 - 8.50	2 and 3
TDS	400 mg/L, or 1.25X background	4
Chloride - Dissolved	250	2
Fluoride - Dissolved	2	3
Nitrate (NO3)	10	1
Nitrite (NO2)	1.0	1
Nitrite + Nitrate as Nitrogen	10	1
Sulfate - Dissolved	250	2
Aluminum - Dissolved	5	3
Antimony - Dissolved	0.006	1
Arsenic - Dissolved	0.01	1
Barium - Dissolved	2	1
Beryllium - Dissolved	0.004	1
Boron - Dissolved	0.75	3
Cadmium - Dissolved	0.005	1
Chromium - Dissolved	0.1	1 and 3
Cobalt - Dissolved	0.05	3
Copper - Dissolved	0.2	3
Iron - Dissolved	0.3	2
Lead - Dissolved	0.05	1
Lithium - Dissolved	2.5	3
Manganese - Dissolved	0.05	2
Mercury - Dissolved	0.002	1
Molybdenum - Dissolved	0.21	1
Nickel - Dissolved	0.1	1
Selenium - Dissolved	0.02	3
Silver - Dissolved	0.05	1
Thallium - Dissolved	0.002	1
Uranium - Dissolved	0.0168 to 0.03	1
Vanadium - Dissolved	0.1	3
Zinc - Dissolved	2	3
Cyanide - Free	0.2	1
Beta and Photon emitters	4 mrem/yr	1
Gross Alpha	15 pCi/L	1

13.10 SURFACE WATER CONTROL & CONTAINMENT FACILITIES INFORMATION

A detailed discussion of surface water management is presented in **Section 2.5**, which includes details of stormwater routing and control features.

13.11 SURFACE WATER QUALITY DATA

Detailed discussions of the surface water quality management program are included in the Sampling and Analysis Plan provided in **Appendix 13-2**. The following extracts from that plan provide both a summary of important elements of the program, and an overview of strategies required to assess the potential impacts of the planned operations within a 2-mile radius of the property.

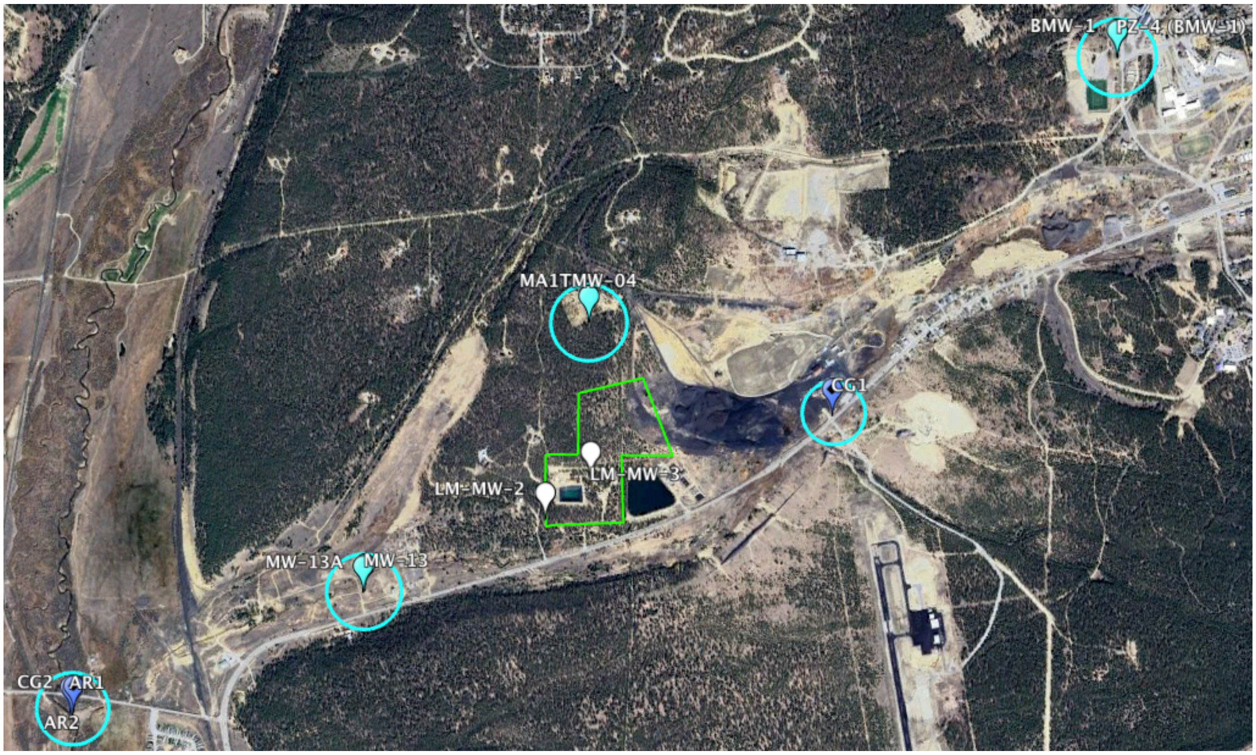
The surface water sampling network includes the four grab-sample locations shown on **Figure 13-2** and summarized in **Table 13-9**. The four sampling points include:

- **CG1**: This sampling point is located upstream of the facility in California Gulch just north of the intersection of US Highway 285 and Lake County Road 23A.
- **CG2**: This sampling point is located downstream of the facility in California Gulch immediately above the confluence with the Arkansas River.
- **AR1**: This sampling point is located in the Arkansas River immediately above its confluence with California Gulch.
- **AR2**: This sampling point is located in the Arkansas River immediately

TABLE 13-9: SURFACE WATER SAMPLING COORDINATES

Identifier	Location	Stream Segment	Latitude	Longitude
	California Gulch			
CG1	Upstream, of proposed facility	6	39.2527	-106.3202
CG2	Downstream near Arkansas River Confluence	6	39.2219	-106.3559
	Arkansas River			
AR1	Upstream of California Gulch Confluence	2b	39.2219	-106.3560
AR2	Downstream of California Gulch Confluence	2b	39.2218	-106.3559

Figure 13-2: Water Sampling Locations



Surface Water Standards are defined by stream segment in 5 CCR 1002-32, Regulation No. 32 Classifications and Numeric Standards for the Arkansas River Basin.

- Locations CG1 and CG2 are in Segment 2b: Mainstem of the Arkansas River from a point immediately above California Gulch to a point immediately above the confluence with Lake Fork.
- Locations AR1 and AR2 are in Segment 6: Mainstem of California Gulch, including all tributaries, from the source to the confluence with the Arkansas River.

13.11.1 SAMPLING FREQUENCY & CONSTITUENTS

The program includes sampling all four surface-water locations on a quarterly basis. Samples will be analyzed by a State certified lab. The field parameters pH, specific conductivity, and temperature, will be collected at each sample point for each event.

All four locations have the same analytical suite, but locations AR1 and AR2 have different standards than CG1and CG2 because they are located in different stream reaches.

Figure 13-3 shows the analytes and standards for Segment 2b, mainstem of the Arkansas River from a point immediately above California Gulch to a point immediately above the confluence with Lake Fork.

Figure 13-3: Constituents & Standards for Segment 2b[1]

2b. Mainstem of the Arkansas River from a point immediately above California Gulch to a point immediately above the confluence with Lake Fork.

COARUA02B	Classifications
Designation	Agriculture
Reviewable*	Aq Life Cold 1
	Recreation E
Qualifiers:	
Other:	

*Designation: 9/30/00 Base-line does not apply
*Cadmium(chronic) = (1.101672-[ln(hardness)*0.041838])*e^(0.7998[ln hardness]-3.1725)
*Uranium(acute) = See 32.5(3) for details.
*Uranium(chronic) = See 32.5(3) for details.
*Zinc(acute) = 0.978*e^(0.8537[ln(hardness)]+2.2178)
*Zinc(chronic) = 0.986*e^(0.8537[ln(hardness)]+2.0469)

Physical and Biological	DM	MWAT
Temperature °C	CS-I	CS-I
	acute	**chronic**
D.O. (mg/L)	---	6.0
D.O. (spawning)	---	7.0
pH	6.5 - 9.0	---
chlorophyll a (mg/m²)	---	TVS
E. Coli (per 100 mL)	---	126

Inorganic (mg/L)	acute	chronic
Ammonia	TVS	TVS
Boron	---	0.75
Chloride	---	---
Chlorine	0.019	0.011
Cyanide	0.005	---
Nitrate	100	---
Nitrite	---	0.05
Phosphorus	---	---
Sulfate	---	---
Sulfide	---	0.002

Metals (ug/L)	acute	chronic
Arsenic	340	---
Arsenic(T)	---	7.6
Cadmium	TVS	SSE*
Chromium III	TVS	TVS
Chromium III(T)	---	100
Chromium VI	TVS	TVS
Copper	TVS	TVS
Iron(T)	---	1000
Lead	TVS	TVS
Manganese	TVS	TVS
Mercury(T)	---	0.01
Molybdenum(T)	---	150
Nickel	TVS	TVS
Selenium	TVS	TVS
Silver	TVS	TVS(tr)
Uranium	varies*	varies*
Zinc	---	SSE*
Zinc	SSE*	---

(1) Table Value Standards. These standards Vary

Figure 13-4 shows the analytes and standards for Segment 6, mainstem of the Arkansas River from a point immediately above California Gulch to a point immediately above the confluence with Lake Fork.

Figure 13-4: Constituents & Standards for Segment 6

6. Mainstem of California Gulch, including all tributaries, from the source to the confluence with the Arkansas River. Mainstem of St. Kevin's Gulch from the source to the confluence with Tennessee Creek.

COARUA06	Classifications
Designation	Agriculture
Reviewable	Recreation N
Qualifiers:	
Other:	
*Uranium(acute) = See 32.5(3) for details.	
*Uranium(chronic) = See 32.5(3) for details.	

Physical and Biological	DM	MWAT
	acute	**chronic**
D.O. (mg/L)	---	---
pH	---	---
chlorophyll a (mg/m^2)	---	---
E. Coli (per 100 mL)	---	630

Inorganic (mg/L)	acute	chronic
Ammonia	---	---
Boron	---	---
Chloride	---	---
Chlorine	---	---
Cyanide	---	---
Nitrate	---	---
Nitrite	---	---
Phosphorus	---	---
Sulfate	---	---
Sulfide	---	---

Metals (ug/L)	acute	chronic
Arsenic	---	---
Cadmium	---	---
Chromium III	---	---
Chromium VI	---	---
Copper	---	---
Iron	---	---
Lead	---	---
Manganese	---	---
Mercury(T)	---	---
Molybdenum(T)	---	---
Nickel	---	---
Selenium	---	---
Silver	---	---
Uranium	varies*	varies*
Zinc	---	---

The two figures are directly copied from the applicable regulations. The standards for analytes with the TVS descriptor are table value standards that are derived from the site specific field data. **Figure 13-5** shows the equations used to generate these standards.

Figure 13-5: Table Value Standards for Applicable Constituents

TABLE VALUE STANDARDS
(Concentrations in µg/L unless noted)

PARAMETER[1]	TABLE VALUE STANDARDS[2][3]
Aluminum(T)	Acute = $e^{(1.3695*\ln(hardness)+1.8308)}$ pH equal to or greater than 7.0 Chronic=$e^{(1.3695*\ln(hardness)-0.1158)}$ pH less than 7.0 Chronic= $e^{(1.3695*\ln(hardness)-0.1158)}$ or 87, whichever is more stringent
Ammonia[4]	Cold Water = (mg/L as N) Total $acute = \frac{0.275}{1+10^{7.204-pH}} + \frac{39.0}{1+10^{pH-7.204}}$ $chronic = \left(\frac{0.0577}{1+10^{7.688-pH}} + \frac{2.487}{1+10^{pH-7.688}}\right) \bullet MIN\left(2.85,\ 1.45 \bullet 10^{0.028(25-T)}\right)$
	Warm Water = (mg/L as N) Total $acute = \frac{0.411}{1+10^{7.204-pH}} + \frac{58.4}{1+10^{pH-7.204}}$ $chronic\ (Apr1 - Aug31) = \left(\frac{0.0577}{1+10^{7.688-pH}} + \frac{2.487}{1+10^{pH-7.688}}\right) \bullet MIN\left(2.85,\ 1.45 \bullet 10^{0.028(25-T)}\right)$ $chronic\ (Sep1 - Mar31) = \left(\frac{0.0577}{1+10^{7.688-pH}} + \frac{2.487}{1+10^{pH-7.688}}\right) \bullet 1.45 \bullet 10^{0.028\bullet(25-MAX(T,\ 7))}$
Cadmium	Acute(warm)[5] = (1.136672-(ln(hardness)*0.041838))*$e^{(0.9789*\ln(hardness)-3.443)}$ Acute(cold)[5] = (1.136672-(ln(hardness)*0.041838))*$e^{(0.9789*\ln(hardness)-3.866)}$ Chronic = (1.101672-(ln(hardness)*0.041838))*$e^{(0.7977*\ln(hardness)-3.909)}$
Chlorophyll *a*[6]	See 31.17 TVS for Aquatic Life and/or Recreation and Direct Use Water Supply (DUWS).
Chromium III[7]	Acute = $e^{(0.819*\ln(hardness)+2.5736)}$ Chronic = $e^{(0.819*\ln(hardness)+0.5340)}$
Chromium VI[7]	Acute = 16 Chronic = 11
Copper	Acute = $e^{(0.9422*\ln(hardness)-1.7408)}$ Chronic = $e^{(0.8545*\ln(hardness)-1.7428)}$
Lead	Acute = (1.46203-(ln(hardness)*0.145712))*$e^{(1.273*\ln(hardness)-1.46)}$ Chronic = (1.46203-(ln(hardness)*0.145712))*$e^{(1.273*\ln(hardness)-4.705)}$
Manganese	Acute = $e^{(0.3331*\ln(hardness)+6.4676)}$ Chronic = $e^{(0.3331*\ln(hardness)+5.8743)}$
Nickel	Acute = $e^{(0.846*\ln(hardness)+2.253)}$ Chronic = $e^{(0.846*\ln(hardness)+0.0554)}$
Nitrogen[6]	See 31.17 TVS for Aquatic Life and/or Recreation.
Phosphorus[6]	See 31.17 TVS for Aquatic Life and/or Recreation.
Selenium[8]	Acute = 18.4 Chronic = 4.6
Silver	Acute = 0.5*$e^{(1.72*\ln(hardness)-6.52)}$ Chronic = $e^{(1.72*\ln(hardness)-9.06)}$ Chronic(Trout) = $e^{(1.72*\ln(hardness)-10.51)}$
Temperature	(see below)

Temperature:

TEMPERATURE TIER	TIER CODE	SPECIES EXPECTED TO BE PRESENT	APPLICABLE MONTHS	TEMPERATURE STANDARD (°C)	
				MWAT	DM
Cold Stream Tier I	CS-I	brook trout, cutthroat trout	June – Sept.	17.0	21.7
			Oct. – May	9.0	13.0

The analytical laboratory reports results to the method detection limit (MDL) for the project, including J-qualified (estimated) values. Laboratory analytical methods will be able to achieve a reporting limit (RL) equal to or less than the standards in **Figures 13-3** and **13-4**. Any changes to the constituent list must be approved in writing by the Division prior to implementation.

13.12 WATER QUALITY MONITORING PLAN

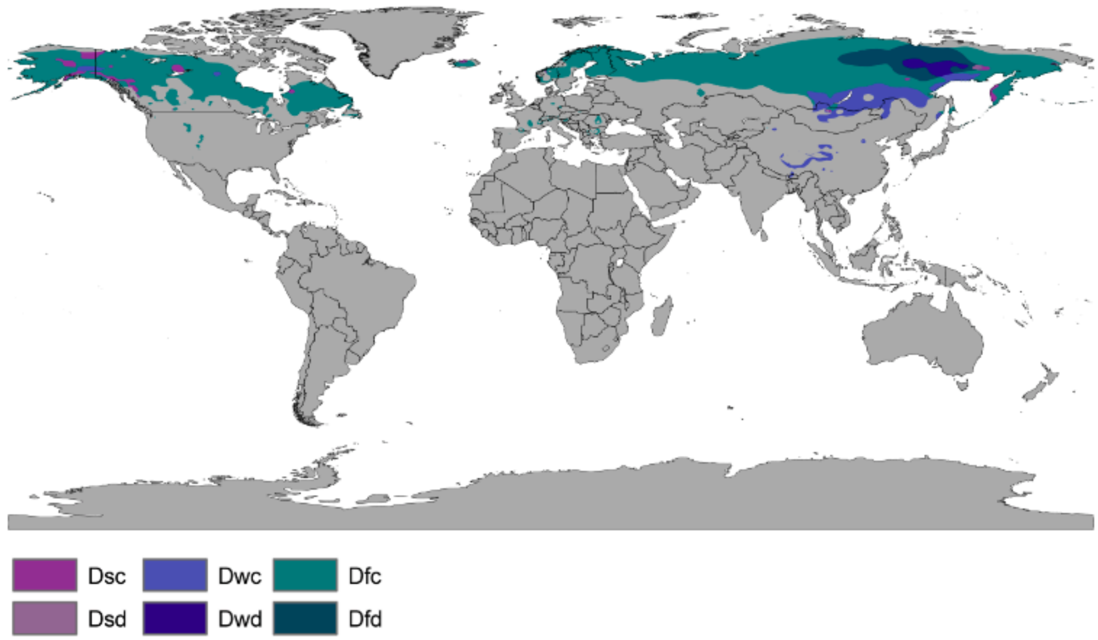
Groundwater monitoring and test results are provided in **Appendix13-4** and are based on the sampling and analysis protocols for both surface and groundwater outlined in the SAP (**Appendix 13-2**).

13.13 CLIMATE

13.13.1 CLIMATE TYPE

Leadville is the southern-most region with an alpine subarctic climate (Dfc) with cold winters and mild summers, bordering on a cold semi-arid climate (Bsk). See **Figure 13-6**. The subarctic climate (also called subpolar climate, or boreal climate) is a climate with long, cold (often very cold) winters, and short, warm to cool summers. It is found on large landmasses, often away from the moderating effects of an ocean, generally at latitudes from 50° to 70°N, poleward of the humid continental climates. Subarctic or boreal climates are the source regions for the cold air that affects temperate latitudes to the South in winter. These climates represent Köppen climate classification Dfc, Dwc, Dsc, Dfd, Dwd and Dsd.

Figure 13-6: Global Dfe Climate Areas



In the most common subarctic climate Dfc, the coldest month averages below 0°C and 1–3 months average above 10°C. There is no significant precipitation difference between seasons. These are generally dry climates but there is little evaporation due to the cold temperatures.

13.13.2 PRECIPITATION

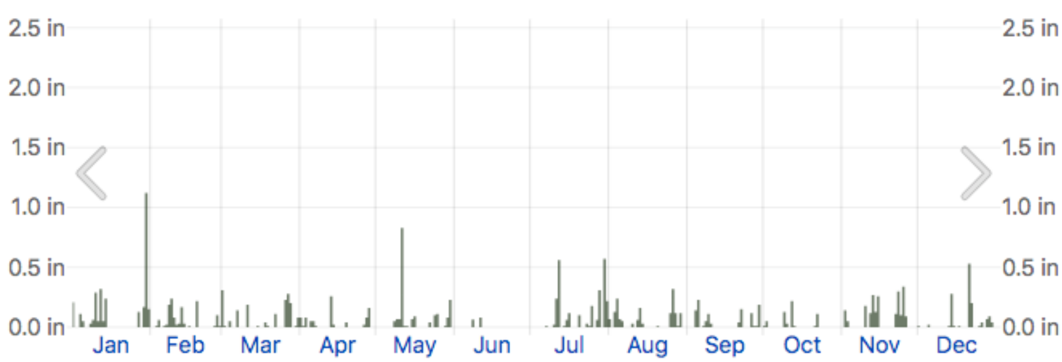
Average annual precipitation is 13.99in (355mm). As shown in **Table 13-10**, the average monthly precipitation from Jan 2019 to Mar 2025 is 1.30in (32mm). The wettest calendar year was 2014 (see **Figure 13-7**) with 18.08in (459.2mm) and the driest 1994 with 8.27in (210.1mm). The most precipitation in one month was 4.83in (122.7mm) in January 1996. The most precipitation in 24 hours was 1.70in (43.2mm) on February 13, 1986. Average annual snowfall is 156.9in (3.99m). The most snowfall in one year was 247.9in (6.30m) in 1996. The most snowfall in one month was 64.1in (1.63m) in April 1995.

Average annual precipitation in the high mountainous regions generally exceeds 40in per year Leadville average rainfall precipitation is approximately 12in whereas snow fall averages over 140in. Average annual lake evaporation for Leadville ranges between 35 and 45in per year.

TABLE 13-10: PENN MINE CONSTITUENT ANALYSIS

Description	Annual Total	Monthly Average	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Normal	**13.35**	**1.11**	**0.99**	**0.91**	**1.02**	**1.36**	**1.06**	**0.82**	**1.72**	**1.70**	**1.13**	**0.90**	**0.86**	**0.88**
Avg 2019-2023	**14.97**	**1.28**	**0.89**	**1.36**	**1.73**	**1.40**	**1.60**	**0.93**	**1.56**	**2.05**	**0.84**	**0.98**	**0.96**	**1.10**
2019	16.41	1.37	1.11	1.01	3.57	1.78	2.85	0.89	0.50	0.83	0.31	1.21	0.95	1.40
2020	15.13	1.26	0.79	2.93	1.18	1.18	1.20	1.07	1.88	0.93	0.97	0.43	1.31	1.26
2021	15.42	1.29	0.40	1.29	1.50	1.22	1.23	0.93	3.64	1.70	0.46	0.60	0.77	1.68
2022	15.27	1.27	0.72	1.08	0.96	1.08	1.30	1.00	2.81	2.42	1.32	1.15	0.72	0.71
2023	13.69	1.14	0.73	0.63	1.32	1.38	1.31	1.06	0.14	3.52	0.85	1.66	0.17	0.92
2024	18.88	1.57	1.63	1.77	2.14	1.95	2.24	0.92	1.22	2.76	1.01	0.80	1.82	0.62
2025	9.99	1.11	0.84	0.82	1.46	1.22	1.05	0.67	0.73	2.21	0.99	NO DATA		

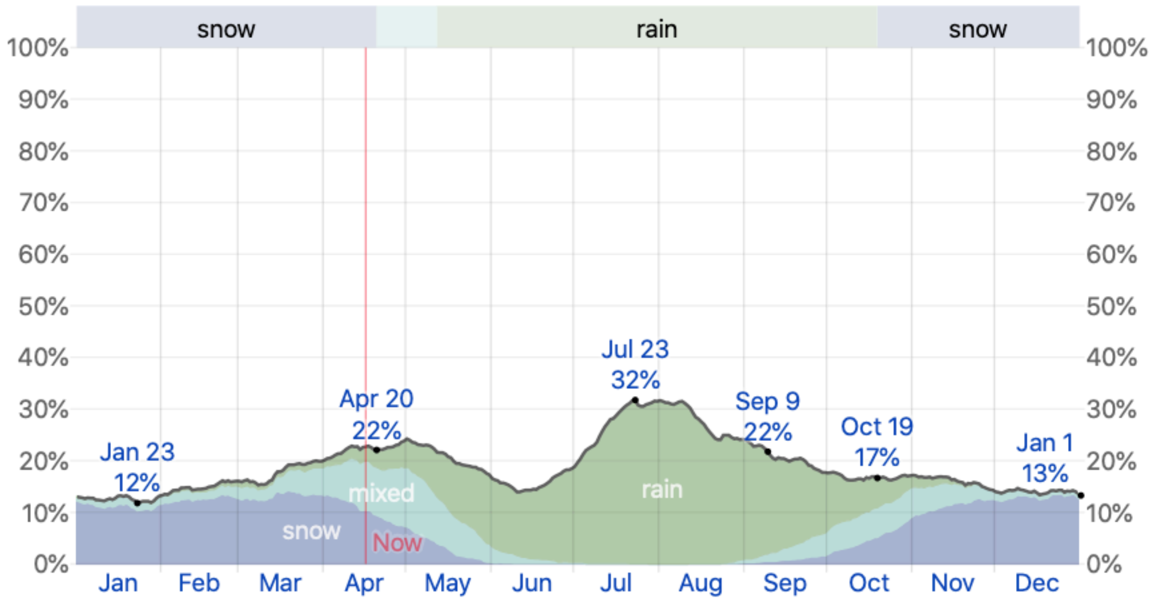
Figure 13-7: 2014 Daily Precipitation



Daily measured quantity of liquid or liquid-equivalent precipitation.
Source: weatherspark.com, 2023

A wet day is one with at least 0.04in of liquid or liquid-equivalent precipitation. The chance of wet days in Leadville shown in **Figure 13-8** varies throughout the year. The wetter season lasts 5.0 months, from April 20 to September 9, with a greater than 22% chance of a given day being a wet day.

Figure 13-8: Daily Chance of Precipitation



The percentage of days in which various types of precipitation are observed, excluding trace quantities: rain alone, snow alone, and mixed (both rain and snow fell in the same day)

The month with the most wet days in Leadville is July, with an average of 8.7 days with at least 0.04in of precipitation. The drier season lasts 7.0 months, from September 9 to April 8. The month with the fewest wet days in Leadville is January, with an average of 3.9 days with at least 0.04in of precipitation. The most common form of precipitation in Leadville North changes throughout the year.

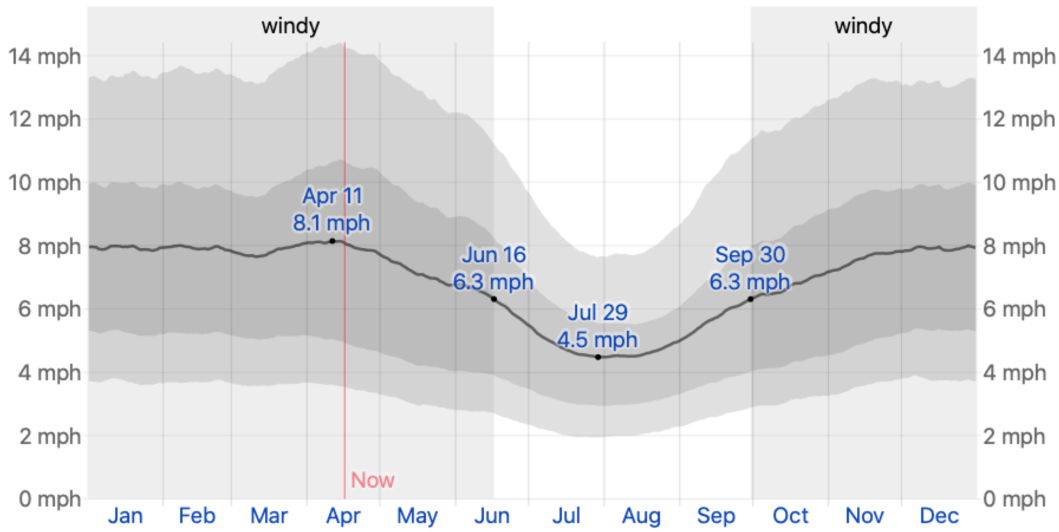
Snow alone is the most common for 5.8 months, from October 23 to April 18. The month with the most days of snow alone in Leadville is March, with an average of 4.0 days. Rain alone is the most common for 5.2 months, from May 12 to October 18. The month with the most days of rain alone in Leadville is July, with an average of 8.6 days. Mixed snow and rain is the most common for 4.1 weeks, from April 18 to May 12 and from October 18 to October 23. The month with the most days of mixed snow and rain in Leadville is April, with an average of 2.8 days.

13.13.3 WIND

The wind experienced at any given location is highly dependent on local topography and other factors, and instantaneous wind speed and direction vary more widely than hourly averages.

The average hourly wind speed in Leadville as shown in **Figure 13-9** experiences significant seasonal variation over the course of the year.

Figure 13-9: Average Wind Speed



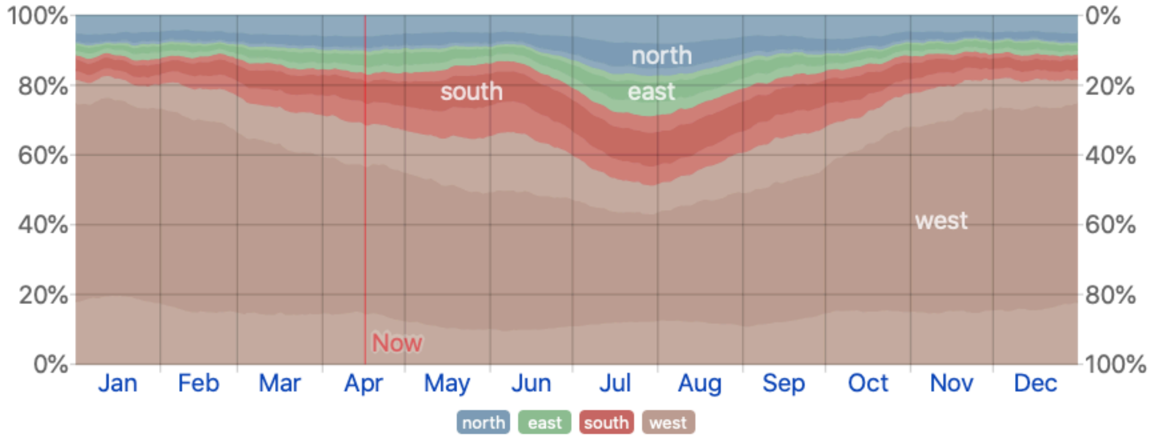
The average of mean hourly wind speeds (dark gray line), with 25th to 75th and 10th to 90th percentile bands. Source: weatherspark.com, 2025

The windier part of the year lasts for 8.6 months, from September 30 to June 16, with average wind speeds of more than 6.2 miles per hour. The windiest month of the year in Leadville is April, with an average hourly wind speed of 7.9 miles per hour.

The calmer time of year lasts for 3.4 months, from June 16 to September 30. The calmest month of the year in Leadville is August, with an average hourly wind speed of 4.6 miles per hour.

The predominant average hourly wind direction in Leadville is from the West throughout the year. See **Figure 13-10**. The percentage of hours in which the mean wind direction is from each of the four cardinal wind directions, excluding hours in which the mean wind speed is less than 1.0 mph. The lightly tinted areas at the boundaries are the percentage of hours spent in the implied intermediate directions (northeast, southeast, southwest, and northwest).

Figure 13-10: Wind Direction



The percentage of hours in which the mean wind direction is from each of the four cardinal wind directions, excluding hours in which the mean wind speed is less than 1.0 mph. The lightly tinted areas at the boundaries are the percentage of hours spent in the implied intermediate directions (northeast, southeast, southwest, and northwest).
Source: weatherspark.com, 2023

13.13.4 TEMPERATURE

The average January temperatures are a maximum of 46°F (8°C) and a minimum of -12°F (-11°C). The average July temperatures are a maximum of 82°F (28°C) and a minimum of 32°F (0°C). There is an average of 271.7 mornings annually with freezing temperatures, which can occur in any month of the year. The record high temperature was 86°F (30°C) on July 17, 2023. The record low temperature was -38°F (-39 °C) on February 1, 1985.

Average temperatures from January 2019 to October 2025 are shown in **Table 13-11** and average 35°F annually compared to that average annual normal temperature of 35°F.

TABLE 13-11: AVERAGE ANNUAL TEMPERATURE °F (JAN 2019-OCT 2025)

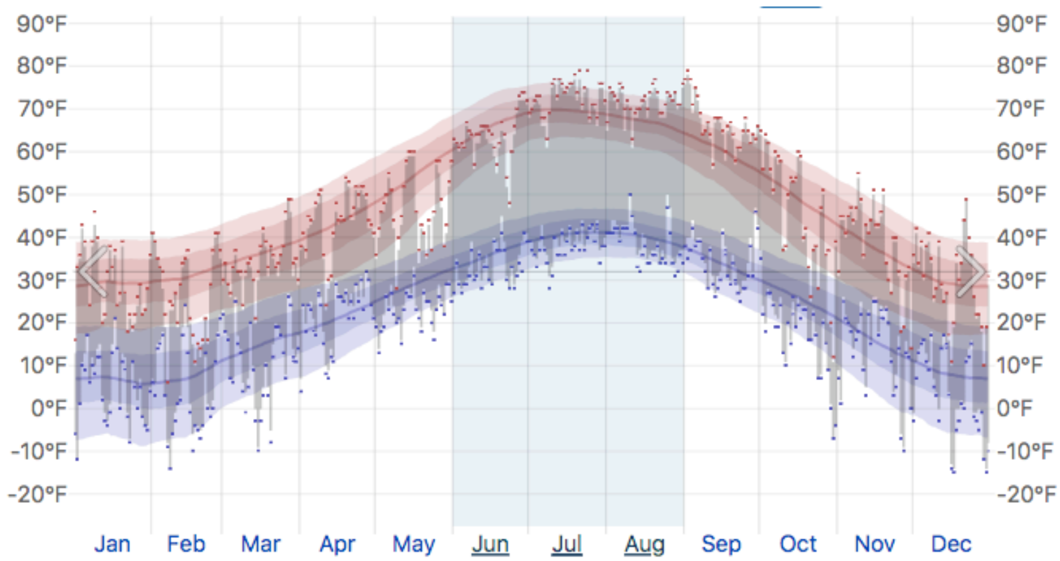
DESCRIPTION		ANNUAL AVERAGE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
NORMAL		35	35	17	18	25	41	50	55	53	47	37	25	17
AVERAGE 2019-2025	MAX	62	46	45	48	59	66	77	81	79	76	66	55	50
	MEAN	35	16	18	23	32	41	51	56	56	48	38	25	19
	MIN	7	-12	-13	-10	0	17	28	31	31	24	2	-7	-11
2019	MAX	61	46	41	49	54	60	74	79	77	79	65	55	49
	MEAN	34	17	16	23	33	35	48	55	55	50	31	26	17
	MIN	5	-12	-14	-10	4	13	27	28	31	25	-7	-10	-15
2020	MAX	63	43	46	43	61	71	75	81	79	78	71	61	50
	MEAN	35	16	16	25	31	43	51	55	56	46	39	26	16
	MIN	5	-8	-18	-2	-7	17	26	27	31	18	-9	-4	-12
2021	MAX	63	42	45	46	63	65	82	81	77	77	64	55	56
	MEAN	35	16	16	25	31	43	51	55	56	46	39	26	16
	MIN	7	-16	-15	-9	1	15	26	33	29	23	13	-2	-10
2022	MAX	62	50	45	52	60	68	77	79	77	79	60	51	44
	MEAN	35	18	15	22	31	41	52	56	55	50	36	21	17
	MIN	6	-13	-22	-21	6	17	27	35	32	25	2	-7	-12
2023	MAX	62	45	42	45	59	64	76	86	78	76	68	55	51
	MEAN	36	15	16	18	29	43	50	61	57	50	39	28	22
	MIN	6	-9	-10	-16	-8	23	30	33	34	25	-13	-9	-8
2024	MAX	63	48	43	46	56	66	79	84	84	74	71	54	50
	MEAN	37	18	21	24	34	39	55	56	57	51	43	25	25
	MIN	10	-6	-9	-7	8	11	29	32	32	29	13	-8	-8
2025	MAX	67	47	53	57	60	72	78	80	82	70	66	NO DATA	
	MEAN	39	12	26	28	33	42	52	55	55	46	39		
	MIN	11	-21	-5	-7	-2	20	28	31	28	26	14		

Source: NOAA, 2025

Figure 13-11 through **Figure 13-17** show daily average, maximum and minimum temperatures for years 2019 to mid-April 2025.

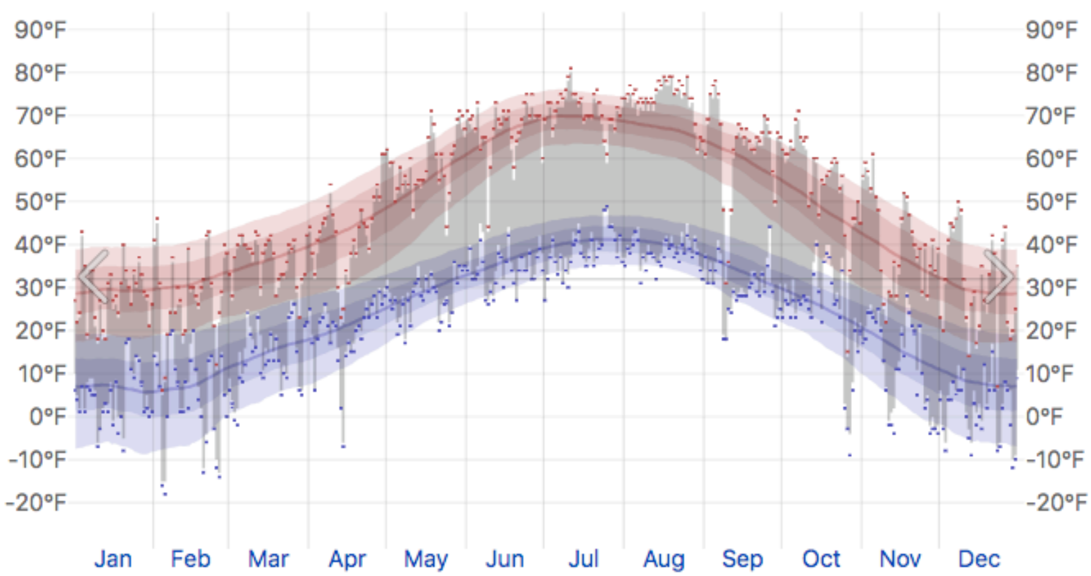
The figures show the daily range of reported temperatures (gray bars) and 24-hour highs (red ticks) and lows (blue ticks), placed over the daily average high (faint red line) and low (faint blue line) temperature, with 25th to 75th and 10th to 90th percentile bands.

Figure 13-11: 2019 Daily Leadville Temperatures



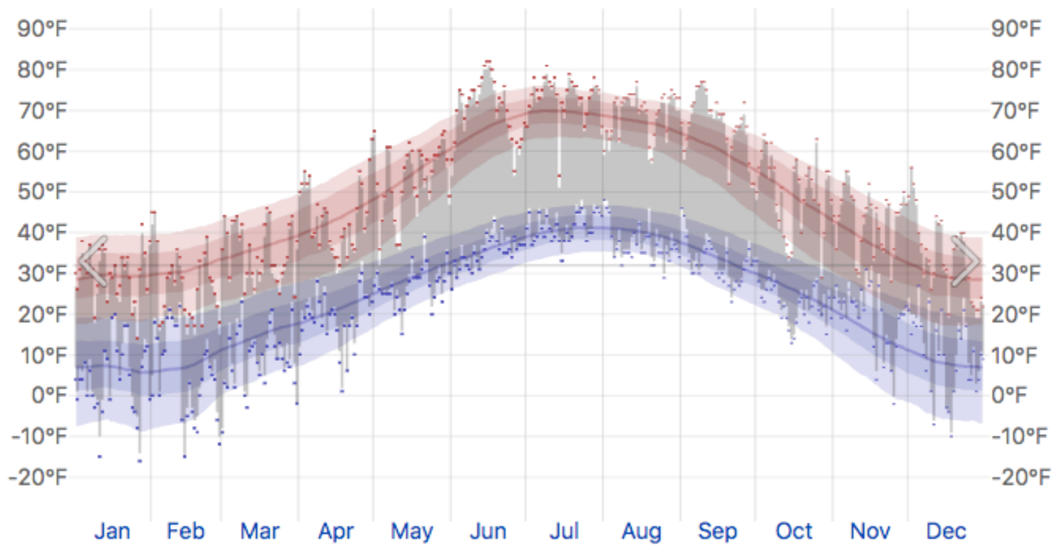
Source: weatherspark.com, 2023

Figure 13-12: 2020 Daily Leadville Temperatures



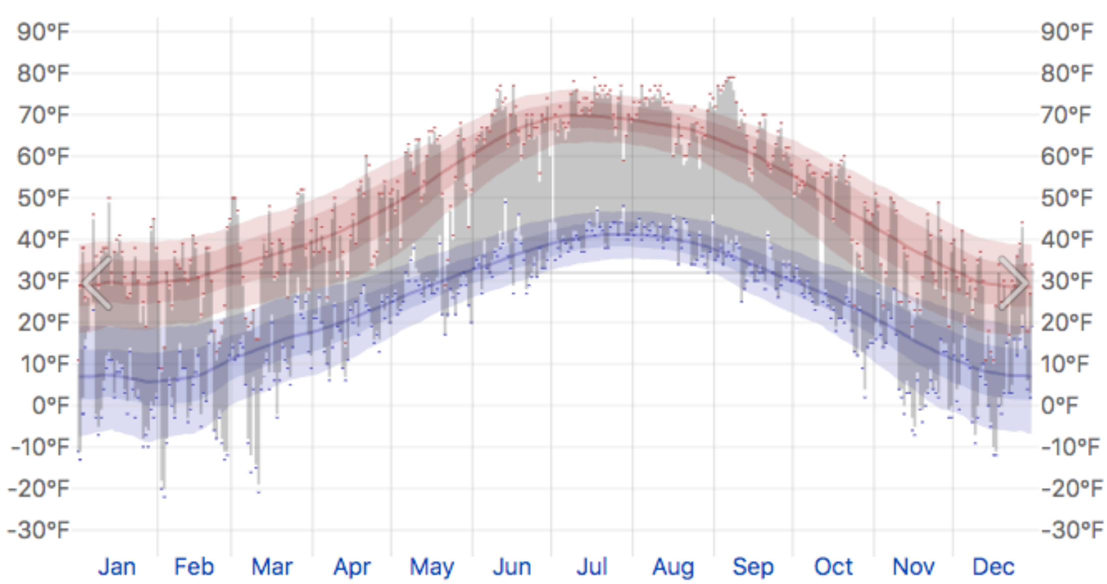
Source: weatherspark.com, 2023

Figure 13-13: 2021 Daily Leadville Temperatures



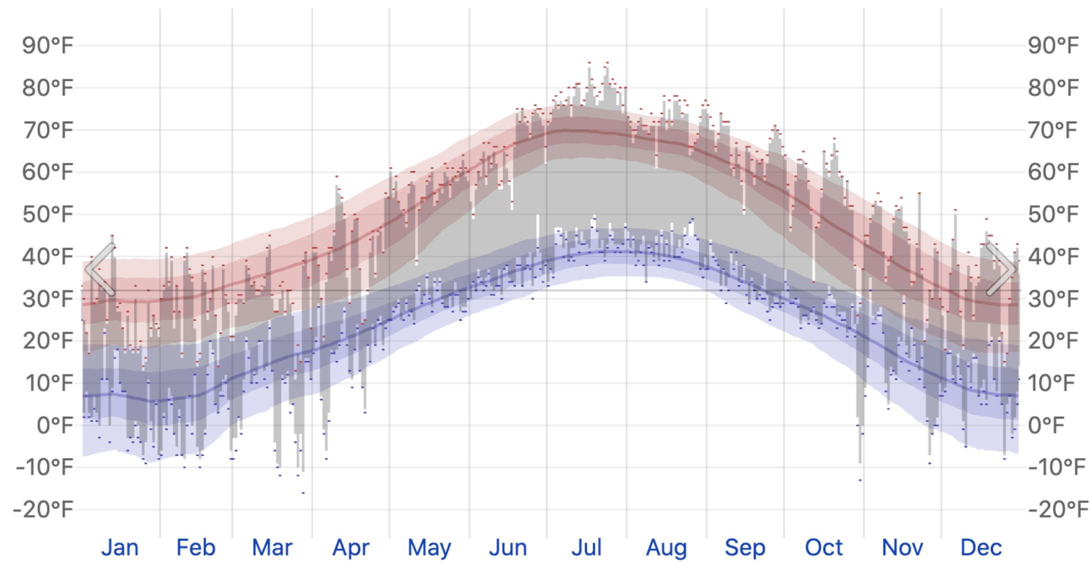
Source: weatherspark.com, 2023

Figure 13-14: 2022 Daily Leadville Temperatures



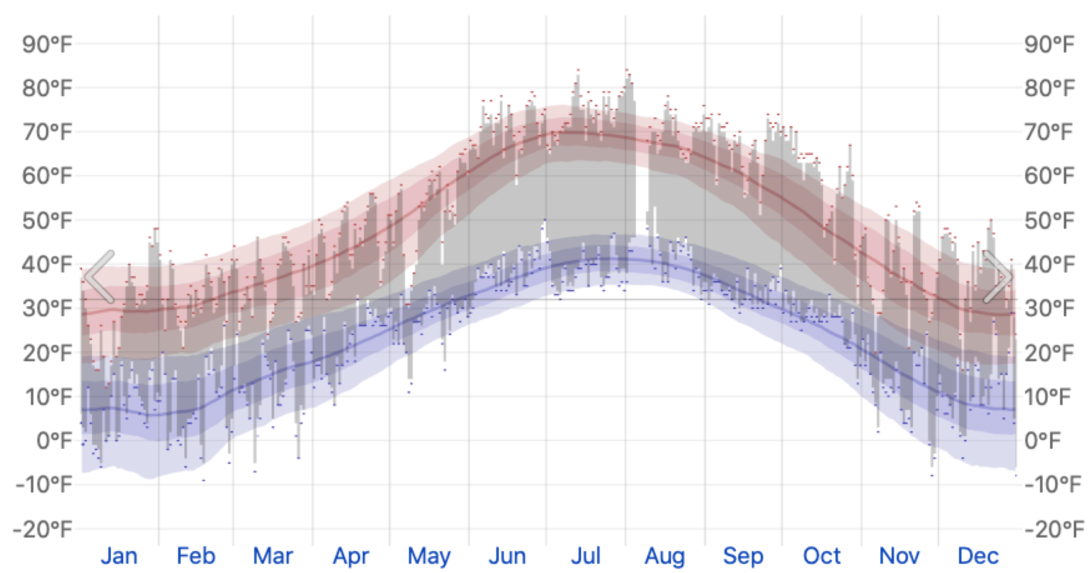
Source: weatherspark.com, 2023

Figure 13-15: 2023 Daily Leadville Temperatures



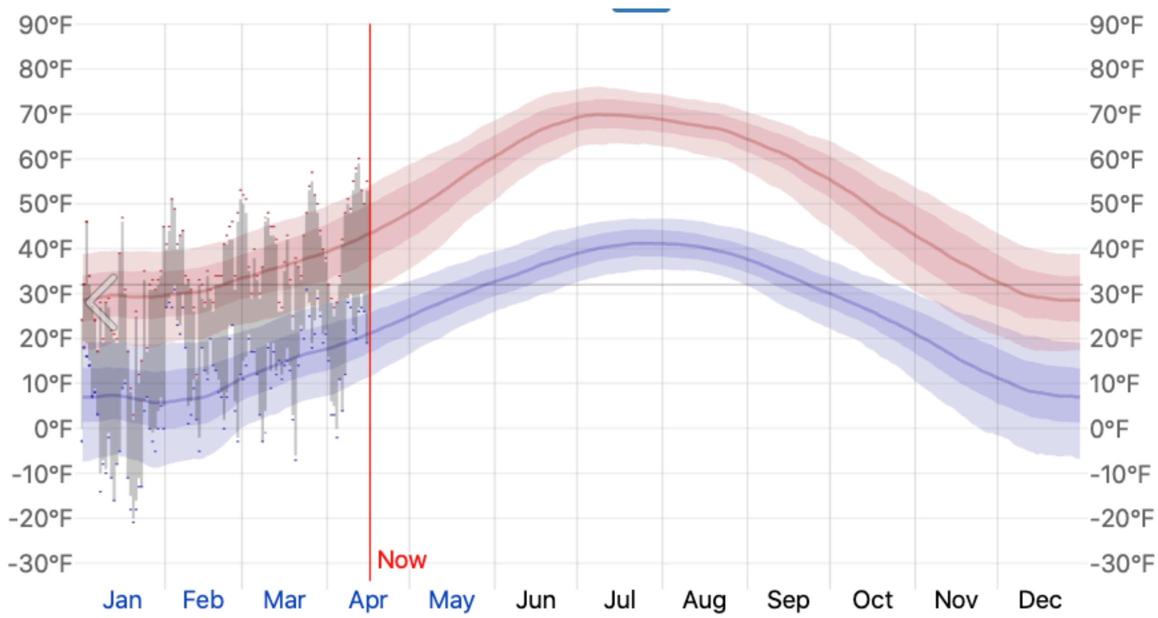
Source: weatherspark.com, 2023

Figure 13-16: 2024 Daily Leadville Temperatures



Source: weatherspark.com, 2023

Figure 13-17: 2025 Daily Leadville Temperatures



Source: weatherspark.com, 2023

13.13.5 EVAPOTRANSPIRATION

UMC has not measured evaporation or sublimation rates at the site. An internet search did not yield meaningful information on sublimation studies in the Leadville Area. However, the following information was found with respect to evapotranspiration in the Leadville area.

TABLE 13-12: EVAPOTRANSPIRATION IN LEADVILLE (30-YR AVERAGE)

	Unit	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
ET Rate	mm/hr	0.00	0.00	0.00	0.13	0.16	0.18	0.17	0.15	0.60	0.13	0.00	0.00

Source: rainmaster.com/historicET.aspx

13.14 GEOCHEMICAL DATA & ANALYSIS

Ore will be analyzed prior to processing to document that the material meets CJK's acceptance criteria based on RCRA (Metals ICP/MS) and Mercury (CVAA) analysis to determine characteristics as well as TCLP tests to determine possible leaching.

RCRA metals analyses, including leachability using TCLP protocols were completed on Penn Mine Dump source feed materials that represent approximately the first 5 years of plant production are shown in **Table 13-13**.

TABLE 13-13: PENN MINE CONSTITUENT ANALYSIS

EPA Waste No.	Hazardous Constituent	Standard (mg/l)	ALS Results (mg/l)	% of Standard
D004	Arsenic	5.0	0.045	0.90%
D005	Barium	100.0	0.182	0.18%
D006	Cadmium	1.0	0.008	0.80%
D007	Chromium	5.0	0.02	0.40%
D008	Lead	5.0	0.037	0.74%
D009	Mercury	0.2	0.00975	4.88%
D010	Selenium	1.0	0.05	5.00%
D011	Silver	5.0	0.01	0.20%

Additional geochemical characterization test work was also completed as part of the tailings characterization program outlined in **Section 3.5**. This work included acid-base accounting and sulfur speciation to confirm acid-generating classification.

The DTL retro-fit design includes features consistent with professional practice and CDPHE approved plans for disposal of industrial solid waste. Refer to **Section 3.5** for details of the supporting characterization test work. Once the level of dry tailings placement reaches a flat limit of waste (2 feet below the top of the lined perimeter berm, additional geotechnical testing protocols will be set in place to confirm stability of the exterior slopes of the above ground portion of the tailings filling program. This above grade placement incorporates 4:1 (H:V) side slopes. Dry tailings placed above grade will be accomplished in 6-in. nominal lifts, compacted to 90% of Standard Proctor density. Design features of the DTL, and retro-fit engineered components providing the basis for the transition of the facility from hydraulic impoundment to a dry tailings landfill are provided in **Section 3.5**.

The Mill is also designed with secondary containment systems and sumps to mitigate spills that could potentially migrate from the mill building. Details are discussed in **Section 3.4**.

13.15 CONSTRUCTION SCHEDULE INFORMATION

Not applicable.

13.16 QUALITY ASSURANCE & CONTROL

A final CDPHE-approved Construction Quality Assurance Plan (CQAP) will be prepared and stamped by a Colorado Registered Professional Engineer prior to the commencement of any construction activities related to field installation of the retro-fit elements of the DTL. General specifications for the added design components of the DTL underdrain system, access ramp, and tailings filter cake placement and management protocols are also provided in **Section 5.5** and on **Figure 3-11** through **Figure 3-15**.

13.17 PLANT GROWTH MEDIUM (SOILS)

This is presented in **Section 4.1**.

13.18 WILDLIFE PROTECTION

This is presented **Section 2.4**. Designated chemicals will be stored inside structures, and inaccessible by wildlife.

13.19 TAILINGS DISPOSAL

There are no surface or underground mine workings within the permitted area. All tailings (process residues) that are generated in the operation are filtered and disposed of mechanically in the DTL. Detailed discussions of the DTL design, tailings characterization and management strategies, surface and seepage water controls, tailings placement and DTL filling plans are provided in **Section 3.5**.

APPENDIX 13-1

MSDS SHEETS

APPENDIX 13-2

SURFACE & GROUNDWATER MONITORING

APPENDIX 13-3

DOMESTIC WELL OWNERS

APPENDIX 13-4

GROUNDWATER MONITORING DATA

14.0 RULE 6.5: GEOTECHNICAL STABILITY

14.1 FTL GEOTECHNICAL INFORMATION

Geotechnical testing of slurry tailings, as well as stability analyses of the original hydraulic impoundment were carried out in support of the original facility design and construction that was approved by the CDRMS. As described in more detail in **Section 3.5** of this application, the amended permit application includes a transformation of the hydraulic impoundment into a dry tailings landfill. Consistent with that transformation and mechanical placement of dry tailings fill within the impoundment boundaries, no further material testing or embankment stability analysis is warranted as the hydraulic impoundment of fully-saturated slurry tailings (the original design) versus dry, stable, and fully- unsaturated tailings solids, represented a significant worst-case scenario from a geotechnical stability perspective. Also as outlined in **Section 3.5**, if an optional extended filling of dry tailings filling above the horizontal limit of waste (i.e., 2 ft. below the existing perimeter berm elevation) is implemented, further testing and analysis will be required. If this expanded fill option is advanced, additional index and strength testing of the dry tailing's solids will be carried out as well as slop stability analysis of the exterior slopes of the above-grade placement sections of the dry tailings fill. Additionally, the construction of the new LLCP is completely below grade, and therefore only construction-related quality assurance testing of the excavated base of the LLCP will require any geotechnical evaluation.

15.0 EMERGENCY RESPONSE PLAN

Insert Emergency Response Plan

Do Not Delete Below This Line For Stephanie's Sake!