Compliance Determination for the Black Butte Copper Project
Proposed by Tintina Montana, Inc.
September 18, 2017

On December 15, 2015, Tintina Montana, Inc., (Tintina), a wholly owned subsidiary of Tintina Resources, Inc., submitted an application for an operating permit to the Montana Department of Environmental Quality (DEQ). The application is for an underground mine and mill at its Black Butte Copper Project (Project) located 15 miles north of White Sulphur Springs in Meagher County, Montana. The Project would produce and ship copper concentrate mined from both the upper and lower zones of the Johnny Lee copper deposit.

All operations would occur within a mine permit boundary encompassing 1,888 acres of privately owned ranch land. Total surface disturbance required for construction and operation of all mine related facilities and access roads comprises 296.03 acres. The proposed operation would mine a total of approximately 15.3 million tons of combined copper-enriched rock and waste rock. This includes 14.5 million tons of copper enriched rock and 0.8 million tons of waste rock. Mining would occur at a rate of approximately 1.3 million tons/year or 3,640 tons of copper-enriched rock per day, over a mine life of approximately 19 years (including construction and reclamation). All rock would be brought to surface through a single mine portal along a decline (tunnel) with additional lower ramp access to both the upper and lower Johnny Lee zones. The mine portal would lie approximately 170 feet above the regional groundwater table. Four ventilation raises would be constructed to surface and collared above the regional groundwater table. One of these ventilation raises would be constructed as a secondary emergency escape way. All surface access to the mine would be located well above the groundwater table to eliminate the possibility of water discharge from any of the mine workings after closure.

Mining would use a drift and fill method. Approximately 45% of the mill tailings would be mixed with cement and binder to form a paste, and used to backfill production workings during the sequential mining of drifts. This paste backfill method would allow maximum extraction of copper-enriched rock without the need to leave pillars for structural support. The backfill also would eliminate the risk of subsidence to surface, and would minimize groundwater contact with mineralized rock both during operations and after closure. The use of paste backfilling and the drift and fill mining method would minimize the surface area of underground mineral deposit exposed to circulating air and moving groundwater at any given time during the mine life.

Although much of the waste rock that would be trucked to surface would be non-acid generating, as a safeguard, all waste rock would be assumed to contain sulfide minerals and would be treated as potentially acid-generating (PAG). A temporary waste rock storage facility, lined with a high-density polyethylene (HDPE) geotextile, would be constructed between the portal and the mill. The temporary waste rock storage facility would receive all of the waste rock generated until construction of the cemented tailings facility is completed. The temporary waste rock storage facility would be reclaimed in year three. All waste rock placed in the temporary waste rock storage facility would be removed and placed in the cemented tailings facility once it is constructed.

The completed cemented tailings facility would receive crushed waste rock for use as a protective cushion layer over the uppermost of its double HDPE liners. All future waste rock would be placed into the cemented tailings facility along with the mill tailings. At closure, the cemented tailings facility would be dewatered, sealed with a cover of HDPE geotextile welded to the bottom liner, followed by placement of soil and vegetation.

A separate ore stockpile on a smaller lined pad would be constructed off of the northwest corner of the portal pad near the end of the construction period to contain a reserve of copper-enriched rock for mill feed. Milling would use a grinding/flotation process and would produce approximately 440 tons per day of copper-rich concentrate. Concentrate would be shipped by truck in closed shipping containers to a regional railhead facility in Montana.

Dewatering of underground mine workings would provide all water required for mining and milling. Excess water pumped from the mine would be treated in a reverse osmosis (RO) water treatment facility to non-degradation standards and be released through underground infiltration galleries under a Montana Pollutant Discharge Elimination System (MPDES) permit. A permitted public water supply well would provide potable water.

Railhead shipping locations currently being considered include those at Raynesford, Belt, Livingston, Townsend, and Harlowton. The company's final decision would be based on economic considerations at the time of shipping. The use of shipping containers eliminates the need for surface stockpiles and multiple handling stages during transport. A process water pond, double lined with HDPE geotextile, with an underlying foundation drain and pond, would store water needed for milling. Water would be recycled between the process water pond and the mill during operations. A paste plant in the mill complex would mix fine-grained tailings from the milling process with cement for deposition both underground and in the cemented tailings facility. The plant would mix approximately 45% of the tailings with approximately 4% cement and other binders to be used as paste backfill in the mine workings. The other 55% of the tailings would be mixed with 0.5 to 2% cement and other binders, which would be pumped to the cemented tailings facility where it would set up to form a non-flowable mass. The use of cemented tailings would inhibit dust formation and provide added strength. The small amount of free water that would collect in the cemented tailings facility from cemented tailings seepage would be pumped to the process water pond for reuse in the mill. Water not needed in the mill during mining operations, would be pumped directly from the process water pond to the RO water treatment facility for treatment and then released to the underground infiltration galleries.

Both the cemented tailings facility and the process water pond would use bottom liner systems comprised of a high-flow geonet-layer sandwiched between two layers of 100 mil HDPE geotextile liner. The geonet layer would act as a drain layer between the two liners that in both facilities would report to seepage collection sumps as part of an internal basin drain system. Water accumulating in both of these sumps would be pumped directly back to the process water pond for storage and reuse in the mill. Both facilities would also incorporate foundation drains beneath the liners to remove groundwater at the cemented tailings facility or vadose zone water at the process water pond from beneath these facilities. This water would be collected in foundation drain ponds that are also pumped back to the process water pond for storage and reuse in the mill.

Tintina would have to obtain a groundwater appropriation permit for groundwater beneficially used in the milling process, before using any groundwater. Since the Project is located in a closed basin, a mitigation plan would be prepared and submitted to the Montana Department of Natural Resources and Conservation (DNRC) to offset potential adverse effects due to the consumptive use portion of the groundwater right. Tintina is in the process of developing a groundwater appropriation permit and corresponding draft mitigation plan.

Tintina has designed an unlined noncontact water reservoir as the preferred option for storing water used for mitigation by its subsequent release back to shallow groundwater by infiltration or direct discharge to the stream. This reservoir could be filled using water rights during the irrigation period of the year, to off-set consumptive use during the non-irrigation months of the year. However, DNRC would determine how much depletion actually needs to be mitigated and therefore, indirectly whether the final mitigation plan (and therefore the final construction plan) would need to include the non-contact water reservoir.

The closure and reclamation plan has been designed to ensure that the site is returned to pre-mining beneficial uses. The primary objective of these activities is to assure the physical and chemical stability of all facilities, and that water quality and quantity are maintained. No waste rock would be left on surface in closure except that disposed of in the cemented tailings facility. Mine closure and reclamation would remove, treat, and dispose of all water from the tailings facility, the process water pond, and the contact water pond until the facilities are empty and can be reclaimed. Water treated during closure would meet nondegradation criteria and would be discharged to underground infiltration galleries for as long as the water treatment plant is operational. Closure work would involve progressive reclamation and revegetation of the embankments and any other disturbed surfaces. Closure and reclamation would focus on removal of surface infrastructure and exposed liner systems, and covering exposed tailings. Reclamation plans include removal of all buildings and their foundations and surface facilities including the portal pad, copper mineralized stockpile pad, process water storage pond, contact water pond, mill site, and non-contact water reservoir. Plans also include re-contouring, subsoil and soil replacement, and revegetating all the sites with an approved seed mix.

Tintina plans to use the on-site water treatment plant during construction, operations and early closure. In addition, Tintina would leave the pumps in the cemented tailings facility in early closure during monitoring. Water produced from the cemented tailings facility in closure would go directly to the water treatment plant. This process would continue into closure while water quality and flow are monitored, with gradually decreased monitoring until sufficient data are available to provide evidence that final closure objectives have been met. Closure objectives are expected to be attained by treatment within one year after mining and milling is completed and once initial facility closure activities have been sufficiently implemented. Facilities are expected to meet all water quality standards and non-degradation criteria in regional groundwater post-closure and in discharge to the infiltration galleries during construction and closure

When reviewing an application for an operating permit, DEQ is required to follow the procedure set forth in Section 82-4-337, Montana Code Annotated (MCA). Under Section 82-4-337, MCA, DEQ is required to review a permit application for completeness and compliance. When DEQ determines an application is complete and compliant, DEQ is required to detail in writing the substantive requirements of the Metal Mine Reclamation Act (MMRA) and how the application complies with those requirements. This document sets forth DEQ's determination that the operating permit application complies with the substantive requirements of the MMRA.

The compliance determination required under Section 82-4-337(1)(d), MCA, is issued in conjunction with issuance of a draft permit and is made prior to the environmental review of the proposed permit under the Montana Environmental Policy Act (MEPA), Title 75, Chapter 1, MCA. DEQ may add stipulations to a final permit that are not included in the draft permit pursuant to Section 82-4-337(2)(b), MCA. That provision allows DEQ to add stipulations to a final permit that were not included in the draft permit, either with the applicant's consent or by DEQ's providing the applicant, in writing, the reason for the stipulation, a citation to the statute or rule that gives DEQ the authority to impose the stipulation, and the reason that the stipulation was not contained in the draft permit.

In order to be approved, reclamation plans must satisfy the requirements and standards set forth in Section 82-4-336, MCA, taking into account the site-specific conditions and circumstances, including the post-mining use of the mine site. The following discussion evaluates compliance with each of the applicable standards set forth in Section 82-4-336, MCA.

1. Section 82-4-336(2), MCA.

Section 82-4-336(2), MCA, requires the reclamation plan to provide that reclamation activities, particularly those relating to the control of erosion, be conducted simultaneously with the operation and in any case must be initiated promptly after completion or abandonment of the operation on those portions of the complex that would not be subject to further disturbance.

Construction/operational reclamation would take place during operations to stabilize disturbed areas during and shorty after mine facility construction (Section 7.1.3, Construction / Operational Reclamation). Operational reclamation is focused upon construction disturbances associated with facilities that would remain in place throughout life of mine operations (i.e., cut and fill slopes, downstream embankments, pipe line trenches, access roads and erosion control ditches and berms), or those that occur peripheral to and between constructed mine facilities. Interim reclamation of temporary or construction roads, embankments, soil stockpiles, ditch cuts and fills, trenches, surface water control structures, and other disturbances not inherently stable would occur during the first appropriate seeding season following construction. Reclamation of disturbed areas would be carried on throughout operations to the maximum extent practicable.
The temporary waste rock storage facility and the excess excavation materials stockpile located west of the waste rock storage facility would be reclaimed near the end of the second year of facility construction. Both of these facilities are located immediately west of the portal pad. The temporary waste rock storage facility pad is designed to hold the first two years of development mining waste until the cemented tailings facility is completed. The temporary waste rock storage facility pad liner would be removed and shipped off-site for disposal or recycling, compacted surfaces at the base of the waste rock storage facility stockpile would be ripped to relieve compaction and allow for future water infiltration, and the excess material stockpile would be used to reclaim the waste rock storage facility pad to near preexisting topography.

2. Section 82-4-336(3), MCA.

Section 82-4-336(3), MCA, requires the reclamation plan to provide that reclamation activities be completed not more than two years after completion or abandonment of the operation on that portion of the complex unless DEQ provides a longer period.

Section 7.2 (Disturbed Lands Reclamation Compliance) states that in the absence of an order by DEQ providing a longer period for mine-related facilities, reclamation activities would be completed not more than two years after completion or abandonment operations. Interim reclamation of soil stockpiles, cut and fill slopes, and other construction-related disturbance would occur during the first appropriate seeding season following construction.

Section 7.4 (Reclamation Schedule) notes that that long-term closure of the site is expected to take approximately 2 to 3 years, excluding long-term revegetation establishment and water quality monitoring. All major facilities have reclamation and closure plans associated with them, as described previously in Section 7.3.3, with the exception of the main Project access road (which would be downsized in closure).

In final closure, all buildings, related equipment, and surface infrastructure at the mine site will be dismantled and removed. Salvageable equipment and construction materials will be sold. The buildings will be dismantled and recycled or disposed of at an approved facility, as will all above ground piping and other infrastructure. The property owners may request surface facilities remain and be transferred to the ranch estate. In that event, Tintina would be required to amend its operating permit to allow surface facilities with a legitimate post-mining use to remain post closure.

3. Section 82-4-336(4), MCA.

Section 82-4-336(4), MCA, requires the reclamation plan to provide that the operator may not depart from an approved plan without previously obtaining from DEQ written approval for the proposed change in the absence of emergency or suddenly threatening or existing catastrophe.

Section 7.2 (Disturbed Lands Reclamation Compliance) states that in the absence of an emergency or sudden threatened or existing catastrophe, Tintina would not depart from the approved reclamation and closure plan without previously obtaining written approval for the proposed change from DEQ in accordance.

4. Section 82-4-336(5), MCA.

Section 82-4-336(5), MCA, requires the reclamation plan to avoid accumulation of stagnant water in the development area to the extent that it serves as a host or breeding ground for mosquitoes or other disease-bearing or noxious insect life.

Section 7.2 (Disturbed Lands Reclamation Compliance) states that steps would be taken to avoid accumulation of stagnant water in the development area to the extent that it serves as a host or breeding ground for mosquitoes or other disease-bearing or noxious insect life in accordance with MCA 82-4-336(5).

Tintina is required to apply for storm water discharge permits associated with construction activities and industrial operations from the DEQ's Water Protection Bureau. The applicant must prepare a Storm Water Pollution Prevention Plan (SWPPP) which is designed to protect State waters from transported pollutants and sediment. Major components of the SWPPP include assessing the characteristics of the site such as nearby surface waters, topography, and storm water run-off patterns, identifying potential sources of pollutants, and identifying best management practices (BMPs) which would be used to minimize or eliminate the potential for pollutants to reach surface waters through storm water run-off (Section 3.7.6). The majority of storm water run-off at the site would be controlled by diversion structures around disturbed areas. A surface water diversion ditch around the upper sides and side slopes of disturbed areas would be used to divert clean storm water from the disturbed facility areas within the site. The surface water diversion ditches would maximize the collection of non-contact run-off from the catchments upstream of the temporary waste rock storage pad, contact water pond, cemented tailings facility, process water pond, and noncontact water reservoir and convey it around these facilities for downstream discharge (Section 3.7.5.2). Diversion of storm water run-off under the SWPPP would avoid the accumulation of stagnant water that may serve as a breeding ground for mosquitos or other disease-bearing or noxious insect life

During operations, the surface facilities include the process water pond and the noncontact water reservoir. These facilities are not expected to provide shallow stagnant water that could serve as a breeding ground for mosquitos or other disease-bearing or noxious insect life. In addition, the reclamation plan requires the complete removal and reclamation of the process water pond (Section 7.3.3.4) and the noncontact water reservoir (Section 7.3.3.2). The areas once covered by these facilities would be graded to form a free draining area and to blend with surrounding topography, covered with topsoil/subsoil, and revegetated.

5. Section 82-4-336(6), MCA.

Section 82-4-336(7), MCA, requires the reclamation plan to require all final grading to be made with nonnoxious, nonflammable, noncombustible solids unless DEQ grants approval for a supervised sanitary fill.

Section 7.2 (Disturbed Lands Reclamation Compliance) states that all final grading would be made with non-noxious, nonflammable, noncombustible solids.

Section 7.3.4 (Soil Salvage, Handling, and Redistribution) notes that soil and subsoil would be salvaged from facility construction areas, constructed roads, and hydrology infrastructure sites prior to major excavation for facility construction. Sites where soils would be salvaged, but not stockpiled, include small disturbances such as vent raises and water wells. Areas where soils would be immediately replaced include pipeline trenches, roadside disturbances, diversion ditch perimeters, buried powerlines, and excavation excess stockpile areas. Salvaged soil would be stockpiled for replacement during reclamation activities.

Section 7.3.4.1 (Soil Salvage) notes that suitability of soil and subsoil proposed for reclamation was determined from physical and chemical data collected during the baseline soil survey. The volume of soil suitable for salvage and reclamation use was limited by slope, shallow depth to bedrock, coarse fragment quantity, and exposed bedrock at the construction site.

It is expected that soil thickness would vary considerably throughout the proposed disturbance area. Adequate soil volume to support reclamation is available. However, in the event of a shortage of cover soil, soils containing coarse fragments in excess of 50 percent by volume would be screened and salvaged for use in reclamation so that no offsite topsoil would be required. Coarse material would be used as fill during reclamation and closure.

All suitable topsoil and subsoil within the recommended salvage depths would be removed prior to commencing construction activities. To the extent practicable, salvage activities would be timed to avoid periods of wet or saturated soil in order to limit soil compaction. If possible, soil removed from an area would be hauled directly to, and used to reclaim, another previously disturbed area (thus eliminating the need for prolonged storage). Soils removed during road construction would be concurrently used to revegetate adjacent cut and fill slopes. The salvaged soil to be used in reclamation is non-noxious, nonflammable, and noncombustible.

6. Section 82-4-336(7), MCA.

When mining has left an open pit exceeding two acres of surface area and the composition of the floor or walls of the pit is likely to cause formation of acid, toxic, or otherwise pollutive solutions on exposure to moisture, Section 82-4-336(7), MCA, requires the reclamation plan to include provisions that adequately provide for:

1. Insulation of all faces from moisture or water contact by covering the faces with material or fill not susceptible itself to generation of objectionable effluents in order to mitigate the generation of objectionable effluents;

2. Processing of any objectionable effluents in the pit before they are allowed to flow or be pumped out of the pit to reduce toxic or other objectionable ratios to a level considered safe to humans and the environment by DEQ;

3. Drainage of any objectionable effluents to settling or treatment basins when the objectionable effluents must be reduced to levels considered safe by DEQ before release from the settling basin;

4. Absorption or evaporation of objectionable effluents in the open pit itself; and

5. Prevention of entrance into the pit by persons or livestock lawfully upon adjacent lands by fencing, warning signs, and other devices that may reasonably be required by DEQ.

The proposed plan is for an underground mine and therefore, the reclamation plan does not need to include any of the provisions set forth in Section 82-4-336(7), MCA.

7. **Section 82-4-336(8), MCA.**

Section 82-4-336(8), MCA, requires a reclamation plan to provide for vegetative cover if appropriate to the future use of the land as specified in the reclamation plan. The reestablished vegetation cover must meet county standards for noxious weed control.

Tintina's proposed post-mining revegetation is based on an evaluation of baseline vegetation type acreages within the proposed disturbance footprint. Impacted vegetation types primarily include upland shrubland; conifer forest and woodland; upland grassland; with minor amounts of lowland and altered grassland, riparian and wetland, and miscellaneous disturbed areas. Tintina proposes to use the following four seed mixes for permanent revegetation: upland grassland seed mix, upland shrubland seed mix, conifer forest and woodland seed mix, and hay meadow seedmix.

These mixtures were formulated based on pre-mining species composition and anticipated post-mining site conditions (soils, topography, slope, etc.). These species are self-regenerating, and are compatible with other plant, wildlife, and livestock species in the vicinity. The seed mixtures would provide a diverse and permanent plant cover that would effectively stabilize the post-mining soil surface.

Seed that is genotypically and phenotypically adapted to the Project area and primarily from within the Northern Rocky Mountains or Great Plains would be used when commercially available in sufficient quantity and of acceptable quality. Seeding rates have been calculated on a Pure Live Seed (PLS) basis. All seed would be documented noxious weed-free. Seed that would be utilized to grow tree tublings would be collected on site and grown in an approved nursery.

Post-mining tree planting rates are based on pre-mine densities of all size classes of trees on a per-acre basis that would be disturbed, adjusted for an anticipated mortality rate of 50 percent. Tree planting stock would consist of tublings. Trees would be planted on 16.5 foot centers in Conifer Forest and Woodland revegetation areas.

Re-established vegetative cover would meet county standards for noxious weed control in accordance with MCA 82-4-336(8).

These revegetation requirements would achieve the approved post-mine land use of livestock grazing and hay production.

8. **Section 82-4-336(9)(a), MCA.**

With regard to disturbed land other than open pits or rock faces, Section 82-4-336(9)(a), MCA, requires the reclamation plan to return all disturbed areas to comparable utility and stability as that of adjacent areas. If the reclamation plan provides that mine-related facilities would not be removed or that the disturbed land associated with the facilities would not be reclaimed by the permittee, the post-mining land use must be approved by DEQ.

Tintina would reclaim all disturbed land to comparable utility and stability as that of adjacent areas. Tintina's proposed reclamation plan provides construction measures that would be applied site-wide during permanent closure. They include facility removal, landform restoration, surface reclamation, and closure activities.

Reclamation of facility areas would include removal and off-site disposal or recycling of liners, filling of excavated basins, and reshaping of the ground surface. This would be done by placing embankment or other fill materials to create a self-draining surface approximating the pre-mining topography that would provide long-term stability after closure. This surface would be capped with soil and revegetated. Specific revegetation measures include soil replacement using the stockpiled topsoil and subsoil, seedbed preparation and seeding with approved seed mixes. In most places, soil cover of approximately 11 inches would be placed over the regraded topography. Inactive borrow areas and stockpiles would also be re-contoured, covered with topsoil, and revegetated at closure. All disturbed ground would be re-contoured and revegetated.

The goals of these construction measures are to achieve long-term stability of each reclaimed facility site or remaining embankment, to develop a self-sustaining productive vegetative cover, and to ensure long term protection of the environment with respect to water quality and erosion. Surface gradient restoration would achieve comparable utility as that of adjacent areas, providing a land surface suitable for the post-operation use of rangeland. Tintina's proposed revegetation requirements would achieve comparable utility as that of adjacent areas, achieving the approved post-mine land use of livestock grazing and hay production. See discussion of compliance with Section 82-4-336(8), MCA.

9. Section 82-4-336(9)(b), MCA.

With regard to open pits and rock faces, Section 82-4-336(9)(b), MCA, requires the reclamation plan to provide sufficient measures for reclamation to a condition:

1. Of stability structurally competent to withstand geologic and climatic conditions without significant failure that would be a threat to public safety and the environment;

2. That affords some utility to humans or the environment;

3. That mitigates postreclamation visual contrasts between reclamation lands and adjacent lands; and

4. That mitigates or prevents undesirable offsite environmental impacts.

The proposed plan is for an underground mine that will not create open pits or rock faces. Therefore, the reclamation plan does not need to include any of the provisions set forth in Section 82-4-336(7), MCA.

10. Section 82-4-336(10), MCA.

Section 82-4-336(10), MCA, requires the reclamation plan to provide sufficient measures to ensure public safety and to prevent the pollution of air or water and the degradation of adjacent lands.

Air Quality

Tintina would either modify its existing air quality permit or submit an application for and acquire a new Montana air quality permit under the Montana Clean Air Act prior to construction and mining activities at the site that specifies requirements for applicable state and federal air quality standards. The air quality permit application requires that the applicant demonstrate compliance with all applicable State and Federal regulations and ambient air quality standards. As part of that application, a list of equipment and specifications for all stationary emissions sources would be compiled for submittal to DEQ's Air Quality Bureau for review and final determination of permitting needs. Detailed information would be provided for the two diesel generators (545 kilowatt (kW) and 320 kW) proposed for the construction and pre-production mining phase, the air compressor used temporarily during initial underground construction (prior to line-power being connected), and the two main back-up 1 megawatt (MW) generators used operationally as well as the other four small emergency generators used for hoists for emergency underground mine evacuation operationally, as well as propane heat sources for mine air during winter months. In addition, there would be about eight small trailer-mounted mobile generators used to support various construction projects during facility construction. The conditions of the air quality permit would specify monitoring and reporting requirements in detail and may specifically require air quality monitoring for particulates.

The ambient air monitoring station just west of the core shed would remain operational to accurately characterize and update the period of record for the local meteorology, and to collect additional baseline data during mine permitting.

The Administrative Rules of Montana (ARM) 17.24.115(h) requires that a reclamation plan ensure that precautions are taken to ensure that airborne fugitive dust generated from cuts, tailings, or disposal areas do not become a public nuisance or detriment to flora or fauna. Further, air quality rules under ARM 17.8.308 require that reasonable precautions are taken to prevent emissions of airborne particulate matter.

Tintina would implement dust control measures by watering along access and cemented tailings facility roads and / or using chemicals on high traffic areas near private ranch buildings. This would reduce the impacts of fugitive dust to ensure that it is not further exacerbated by wind. Temporary waste rock and life-of-mine copper-enriched rock storage areas would also be watered as necessary to minimize dust while loading or unloading material. Monitoring by site personnel during each shift would ensure watering is done to the level required to minimize the effects of dust at the site.

Construction related disturbances that may generate dust and are not needed operationally would be re-contoured, covered with soil, and revegetated as quickly as possible following construction. This would include road cut-and-fill slopes, facility berms (waste rock storage facility stockpile, and mill facility), embankments and berms of the cemented tailings facility, contact water pond, process water pond, waste rock storage facility and noncontact water reservoir, buried pipelines, water diversion ditches, and soil / subsoil stockpiles. Dust control from the cemented tailings facility is not expected to be problematic because the material would be moist (20%) and would be stabilized with cement additions to provide a non-flowable mass.

Water Quality

Section 4.2 (Predictive Water Quality Modeling) notes that Tintina has used hydro-geochemical monitoring, hydrogeological modeling and geochemical testing data to design its underground workings, temporary waste rock storage pad, cemented tailings facility, process water pond, contact water pond, and water treatment plant to minimize impacts to water quality. As discussed in Section 4.3.1 (Montana Water Quality Act), Montana law prohibits discharges that degrade the quality of certain surface and ground water resources. Where applicable, the non-degradation rule provides that discharges must not increase the concentration of certain constituents above limits established by the state or the existing concentration of the constituent in the receiving water (background). With the exception of groundwater in the underground workings following closure, water from all facilities would be collected and treated during active stages of the Project, and the resulting water would comply with non-degradation criteria prior to being discharged into underground infiltration galleries.

As noted in Section *3.7.5.3,* Tintina is required to apply for storm water discharge permits associated with construction activities and industrial operations from DEQ's Water Protection Bureau. The applicant must prepare a Storm Water Pollution Prevention Plan (SWPPP) which is designed to protect State waters from transported pollutants and sediment. Major components of the SWPPP include assessing the characteristics of the site such as nearby surface waters, topography, and storm water run-off patterns, identifying potential sources of pollutants, and identifying best management practices (BMPs) which would be used to minimize or eliminate the potential for pollutants to reach surface waters through storm water run-off (Section 3.7.6). The majority of storm water run-off at the site would be controlled by diversion structures around disturbed areas. A surface water diversion ditch around the upper sides and side slopes of disturbed areas would be used to divert clean storm water from the disturbed facility areas within the site. The surface water diversion ditches would maximize the collection of non-contact run-off from the catchments upstream of the temporary waste rock storage pad, contact water pond, cemented tailings facility, process water pond, and noncontact water reservoir and convey it around these facilities for downstream discharge (Section 3.7.5.2). Many BMPs would remain in place through mine operations and closure, and until subsequent stabilization and revegetation of disturbed areas is complete.

Although storm water controls would be constructed contemporaneously with soil removal and stockpiling, there are other components of water management that would be implemented during the construction phase to prevent water pollution and the degradation of adjacent lands. The contact water pond would be constructed early in the Project to provide a collection point for all water on the site prior to treatment. Groundwater may be encountered during the excavation of the cemented tailings facility and its foundation drain system, so excavated collection sumps and pumps would be utilized to capture water. The underground decline tunnel would not likely encounter groundwater in the first 1,700 feet of construction, but after intercepting the regional groundwater table, water would be pumped to the contact water pond prior to water treatment (Section 3.2.2.4). Water treatment during the construction phase would consist of flocculation and clarification, followed by multi-media filtration and final treatment by a two-stage Reverse Osmosis (RO) system and Vibratory Shear Enhanced Processing (VSEP) for volume reduction. Plans have also been developed for the containment and management of liquid and solid treatment residuals (Section 3.7.3.5). As described in Section 3.7.3.3, all water would be treated to meet applicable non-degradation standards prior to discharge in the underground infiltration galleries, which would be constructed early in the Project. This includes the polishing treatment of RO permeate to ensure that discharged water meets hardness and alkalinity of background solutions. Any discharge to the underground infiltration galleries would need to be authorized by DEQ through a MPDES permit.

During the operational phase of the Project, many of the surface facilities would be built on top of HDPE liners and collection sumps to prevent infiltrating water from impacting down-gradient water quality. The facilities would be designed to potentially hold water or process solutions (e.g. process water pond, cemented tailings facility) and would be built with double-liner systems which incorporate interstitial seepage capture systems and underlying foundation drains (Section 3.6). Any water collected by these layered drainage systems would be diverted to a sump pond and then pumped back into a storage facility prior to treatment. The cemented tailings facility is designed to contain massive cemented tailings rather than a pond, so the volume of water contained within the facility would be limited to seepage from the cemented tailings slurry and precipitation. Groundwater from the underground workings is the primary source of water for the entire operation, so some inflow controls like grouting may be implemented to balance the encountered flows with the water usage needs. Section 4.1.6 summarizes the numerical groundwater modeling results, which indicate that mine dewatering could draw down groundwater levels in overlying alluvial units by 5 to 10 feet near Coon Creek and by approximately 1 foot near Sheep Creek. The groundwater depletion is modeled to reduce the surface flow in Sheep Creek by 0.35 cfs, which is approximately 2% of the steady state base flow at that location. A water rights mitigation plan would be approved by DNRC to offset all of the stream depletion by mitigating flows at a rate equal to the consumptive use of the Project. Through the sequential drift and fill mining method, stopes that have been mined would be backfilled with cemented paste tailings. This approach would limit the exposure of sulfide minerals in the rock faces, and the cemented backfill would have a lower permeability than the adjacent bedrock, limiting the potential for groundwater infiltration and reaction in the backfill. As mine development progresses, the underground workings would be dewatered through a series of sumps and pumps located adjacent to the main access ramp decline or along underground working levels of the mine.

Water treatment during operations would follow a similar treatment regime as the construction phase system, with the exclusion of the VSEP volume reduction step. The operating capacity of the water treatment plant would be increased and a back-up RO system would be available for contingency capacity (Section 3.7.3.2). Fresh water would be derived directly from the water treatment plant, and would be used for mill processes, reagent preparation, and fire suppression and protection. Water for other processes would be comprised of recycled water from the process water pond and the milling process, and potentially from the water treatment plant. The liquid and solid treatment residuals would be disposed of on-site using the process water pond and cemented tailings facility, respectively. The remaining stream of treated water would meet the same applicable non-degradation standards, and would be discharged into the underground infiltration galleries authorized through the MPDES permit.

As discussed in Section 7.1.3, permanent reclamation and closure would occur at the end of mine life, but would also be initiated if a temporary closure extends beyond a period of one year. Reclamation would include the dewatering and RO treatment of water from storage facilities (e.g. process water pond and contact water pond), decommissioning the process water pond and cemented tailings facility foundation drain ponds, removing and disposing the HDPE liners, and any ambient groundwater flow within the process water pond footprint would be diverted into an infiltration basin to be constructed at the same location. Other components of closure include the removal of all buildings, site-wide re-contouring of disturbance areas to near pre-mining topography for most facilities (except the cemented tailings facility), drainage stabilization and erosion control, redistribution of soils, establishment of long-term vegetative cover, and site-wide reestablishment of conditions that support pre-mining beneficial land uses. An HDPE cover would be placed on the cemented tailings facility, and welded to the bottom liner to limit water infiltration, followed by the placement of soil and vegetation (Section 7.3.3.3). Any ambient groundwater flow beneath the reclaimed tailings facility would be diverted through the foundation drain outlet pipes and into a downgradient underground infiltration gallery.

Water treatment during closure would utilize the same treatment system and reincorporate the VSEP volume reduction step. The three main phases of water treatment would have the same non-degradation effluent goals. However, the water sources, flow rates, influent water quality, and facilities available for disposal of treatment residuals would vary. A portion of the contact water pond would be used for RO brine storage prior to shipment off-site for disposal. Solid and liquid water treatment residuals would be disposed of on-site if suitable facilities are available, or these residuals would be disposed of off-site. Instead of utilizing treated water for milling operations or discharging into the underground infiltration galleries, the treated water would be used to flush the underground workings and remobilize soluble oxidation products as discussed in Sections 3.7.3.2 and 7.3.3.5. Pumps would be used to remove the rinse water from the workings for continued treatment, and repeated cycles of underground flushing and draining would occur, with active monitoring taking place in order to determine when background conditions have been met and rinsing can cease. A series of bulkheads or hydraulic plugs would be installed at key hydro-lithologic locations to separate hydrologic units and limit direct flow pathways within the mine access tunnels and ventilation raises. The sequence of bulkhead construction and UG flushing is outlined in Section 7.3.3.5. An additional plug would also be installed in the decline access tunnel at the mine portal, but with the slope of the tunnel and the portal location above the water table, there is no potential for drainage out of the portal. It is predicted that the mine would flood to pre-mining groundwater levels within three to four years.

Modeling of water quality within the underground workings indicates that as groundwater returns to background elevations, the pH and alkalinity are predicted to be higher than predicted during operations, with lower sulfate and metal concentrations, as sulfide oxidation would be inhibited in the flooded workings (Section 4.2.3.1). Section 4.2.5 (Summary of Water Quality Predictions) notes that water quality predicted for the underground workings is circumneutral, with modest sulfate and appreciable alkalinity. After backfilled mine workings have been flooded and achieve steady state groundwater flow, the only potential discharge from the mine would be groundwater that acquires solutes from the cemented paste backfill. Geochemical models predict the chemistry of this water, and the results demonstrate that interaction with the backfilled mine workings would not degrade groundwater quality (Sections 4.3.2 and Appendix N). Compliance with the non-degradation nonsignificant policy is evaluated by comparing the predicted water quality at closure to the non-degradation criteria (ARM 17.30.715). The predicted results meet groundwater standards and non-degradation criteria due to the creation of suboxic conditions that eliminate sulfide oxidation following return of the groundwater table to its original elevation, reduced groundwater inflow, concurrent backfilling with a low transmissivity material, flooding with RO treated water at closure, and the placement of hydraulic plugs.

11. Section 82-4-336(12), MCA.

Section 82-4-336(12), MCA, requires a reclamation plan to provide for permanent landscaping and contouring to minimize the amount of precipitation that infiltrates into disturbed areas that are to be graded, covered, or vegetated, including but not limited to tailings impoundments and waste rock dumps. The plan must also provide measures to prevent objectionable postmining ground water discharges.

Cemented Tailings Facility

The cemented tailings facility is designed to store 55% of all tailings generated in the mill over the 15-year active mine life and 100% of the waste rock. Permanent closure of the cemented tailings facility would include dewatering (by pumping any water on the liners, sump or from the foundation drain ponds to the process water pond or the contact water pond), treatment and disposal of process and foundation drain waters, installation of the HDPE cover, ground shaping to create a new closure topography, redistribution of soils, and establishment of long-term vegetative cover.

At closure, all water would be pumped out of the cemented tailings facility (including the sump and foundation drain collection pond), and treated in the water treatment plant. Cement, fly ash, or slag added to the tailings during thickening would solidify the tailings shortly after their deposition and create a stable, non-flowable mass. Natural drying and evaporation would further reduce the moisture content in the tailings as it is deposited, and the cementing consolidation process would consume available water with excess seepage mixing with incident precipitation and reporting to the sump. Prior to final placement of tailings in the cemented tailings facility, the cement content would be increased to approximately four percent, in order to create a hardened surface on which equipment can work, thereby reducing the time required for reclamation and closure of the facility.

Subgrade bedding material may need to be placed above the tailings and general fill to provide a protective layer for HDPE geomembrane placement, depending upon the character of the material that forms the final upper surface. Shaping of the tailings surface may be required for closure. Shaping may be accomplished by selective tailings deposition or placement of general fill material to create a self-draining topographic surface suitable for capping and closure of the cemented tailings facility.

The cemented tailings facility would be covered with a 100 mil HDPE geomembrane, which would be welded to the existing liner system. The geomembrane cover would be capped with non-reactive rock fill and overburden, and graded to control run-off. The capping layer would be a minimum four feet thick and would serve to provide a stable platform for topsoil / subsoil cover and revegetation. The cover material would be sized so that the geomembrane is not damaged during placement.

Final reclamation of the facilities would include decommissioning of the cemented tailings facility foundation drain collection pond and connecting the buried foundation drain system outlet pipe to an underground infiltration gallery, located immediately downstream and to the east of the foundation drain pond. The foundation drain system would be excavated into native bedrock and filled with clean, washed drain-rock. Water would be transmitted to the drain system through perforated PVC pipe. Water collected from the foundation drain system would be discharged to groundwater during closure. Water quality of the foundation drain would be monitored throughout the operation of the cemented tailings facility as part of the water monitoring program. The water quality of the foundation drain system would be compared to baseline water quality.

If the water quality of the foundation drain system shows a significant impact compared to baseline monitoring data from the cemented tailings facility wells, Tintina would install an established mitigation alternative, based on the water quality results. Mitigation alternatives include passive treatment systems or installation of horizontal well(s) upgradient of the cemented tailings facility to capture the groundwater prior to it flowing beneath the cemented tailings facility and discharging it to the underground infiltration gallery. At closure, the foundation drain collection pond would have its liner removed and hauled to an off-site disposal or recycling center. All disturbed ground would be re-contoured and revegetated.

Tintina's operating and reclamation plans provide measures to prevent objectionable post-mining ground water discharges from the cemented tailing facility. As described above, Tintina's proposed liner system for the cemented tailings facility uses two 100 mil HDPE liners and an intervening geonet flow layer between the two liners that collects potential seepage through the upper liner. The seepage through the upper liner is estimated at a maximum of 4 gallons/day over the entire 72 acre facility. This seepage subsequently reports to the cemented tailings facility sump via the geonet layer for removal to the process water pond during operations. In closure any seepage that collects in this sump would be pumped to the contact water pond for temporary storage and eventual processing through the water treatment plant.

Two separate models predict that the potential volume of seepage passing through the cemented tailings facility liner system will be negligible. Therefore, Tintina does not anticipate any significant seepage from the cemented tailings facility to pass through the liner system and enter the underlying foundation drain system. The lack of seepage impact to local groundwater diverted under the facility to the foundation drain pond would be confirmed by monitoring water quality in the drain operationally and in closure until DEQ determines that it is no longer necessary. The point when monitoring is no longer necessary should occur when drain-down of the cemented tailings facility no longer reports in large enough quantities to the cemented tailings facility sump to require removal by pumping.

In addition to the liner system and foundation drain, negligible seepage from the cemented tailings facility is expected as Tintina proposes to remove as much water as possible from the cemented tailings facility sump during operations and in early closure. Finally, newly deposited cemented paste consolidation would occur rapidly, within days. Seepage water from paste dewatering would mix with incident precipitation during operation and report to the cemented tailings facility sump. However; this volume of water flow would be eliminated at closure.

In closure the length of time between placement of the composite HDPE / soil cover and the reduction of flow to the sump to a volume that no longer can be pumped is expected to be on the order of weeks. However, Tintina would leave the sump pump in place during and following final closure of the facility so that any pumpable amount of water collected in the sump could be directed to the contact water pond for storage and then treatment in the water treatment plant.

The foundation drain pond would be removed and water from the drain would be transferred to an underground infiltration gallery immediately down-gradient to the facility and allowed to mix with regional groundwater.

Tintina's operation and reclamation plans also provide measures to prevent objectionable post-mining ground water discharges from the underground workings at closure. Concurrent and following completion of mining, stopes would be backfilled. Treated groundwater would be pumped to flood the workings and used to rinse stored oxidation products from exposed rock surfaces, after which the groundwater table would be allowed to recover to its original elevation. The pH and alkalinity are predicted to be higher, with lower sulfate and metal concentrations, than predicted during operations, as sulfide oxidation would be inhibited in the flooded workings. It is predicted that the water would meet Montana groundwater standards and non-degradation criteria post-closure.

The design and management plan for the underground workings limits open stope areas through concurrent backfilling with a low transmissivity material; provides for water treatment in operations and early closure; floods the lower workings with RO treated water at closure, and isolates the upper and lower workings using hydraulic plugs. No exceedances of groundwater quality standards or non-degradation criteria are predicted.

The predicted changes at closure represent minor changes in water quality, relative to the background water quality. Concentrations of NO_3^- (nitrate), SO_4^{2-} (sulphate), P (phosphorus), Se (selenium), Sr (strontium), and Zn (zinc) are predicted to increase modestly above background levels, but none are expected to exceed DEQ's groundwater quality standards or groundwater non-degradation criteria.

No objectionable post-mining ground water discharges are expected from the other proposed mine facilities. The process water pond and its foundation drain pond would remain in place until the milling of all copper-enriched rock is completed. Operationally, the volume of water in the process pond is expected to be maintained at or below approximately 45 million gallons. At the operational treatment system rate of approximately 500 gallons per minute (gpm), it would take approximately 3 months to treat all of the water in this pond at closure.

Once the process water pond is dewatered, the accumulated slimes would be mixed with cement and air dried and wrapped in the liner in preparation for burial during final facility regrading. The process water pond's foundation drain pond would subsequently be drained, and the water treated and discharged to the underground infiltration gallery system. The foundation drain pond liner would be cut and placed on top of the process water pond liner. The process water pond liner would be folded in on top of the cemented sediment and buried in place. A drainage gravel lined infiltration basin would be constructed in the footprint of the process water pond's foundation drain pond, and if there is any flow from the process water pond's foundation drain, it would be directed through a buried pipeline to the infiltration basin.

Embankment fill from the process water pond would be used to bury the liner system. Because the process water pond would be constructed as a cut and fill material balance facility, there would be ample embankment material available to bury the liners during reclamation to a depth of 30 feet or more below the final reclamation grade, and about 25 feet above the regional groundwater table. The perimeter of both the reclaimed process water pond and foundation drain pond areas would be graded to blend with surrounding topography, covered with topsoil / subsoil , and seeded.

Under the contact water pond closure plan (Section 7.3.3.7), Tintina would keep the contact water pond open into closure. During this time, it would be used in conjunction with the water treatment plant to treat any water that may accumulate in the sump of the closed cemented tailings facility and to treat the remaining volume of water on the process water pond. Treated water would discharge to an underground infiltration gallery, and the brine would be stored in the contact water pond. Brine would ultimately be hauled off-site for disposal. It is not expected that any significant amount of water would accumulate in the cemented tailings facility sump in closure once the welded HDPE cover is placed on the cemented tailings facility. Treatment, however, would continue until monitoring provides sufficient data with regard to water accumulation rates that final closure objectives have been met. The contact water pond would then be closed by treating all water stored within the contact water pond facility. The treated water would be discharged to the underground infiltration galleries. The remaining brine would be hauled off-site for disposal.

Once these tasks are completed, the water treatment system can be dismantled and the contact water pond reclaimed. The contact water pond's liners would be removed and hauled off-site for disposal or recycling. The footprint of the contact water pond would be ripped to relieve compaction, the site regraded, covered with soil, and seeded.

The non-contact water reservoir would be completely reclaimed. (Section 7.3.3.8, Non-Contact Water Reservoir Closure) The liner on the upstream embankment of the reservoir would be removed and placed in the cemented tailings facility during closure. The embankment, surface water diversion channel, and the spillway would be removed and the land reclaimed to near original topographic contours. Soil would be placed on the disturbed areas and the disturbed areas would be seeded. The area previously flooded by the reservoir, including the central 0.95 acre wetland area, would be revegetated with appropriate Lowland and Altered Grassland and Riparian and reclamation seed mixtures.

Presently it is unknown if the local landowner would want to retain a scaled back version of the unlined reservoir facility. However, if that were to change in the future prior to closure, Tintina would need to propose a modified closure plan for DEQ approval for this facility.

Surface water diversion ditches and sediment collection basins (Section 7.3.3.9, Diversion Ditches and Sediment Collection Basins) not retained in post-mining closure would be reclaimed and reseeded. Where it is necessary to retain these features in closure, ditches and basins may be reduced in size to handle the 200-year flood event.

Surface disturbances resulting from excavation and trenching of buried water supply / distribution lines, paste backfill lines, and underground infiltration distribution lines (Section, 7.3.3.10, Pipeline, Underground Infiltration Galleries, and Well Closures) would be reclaimed immediately after initial construction by re-contouring, soil replacement, and reseeding. During final closure, all surface piping would be removed and either disposed of or recycled. Two track access trails along the lines would be ripped and revegetated. Underground piping would not be removed. However, the ends of solid sections of piping would be excavated and the pipe ends capped.

Monitor wells not scheduled for post closure monitoring would be plugged and abandoned according to applicable laws, including ARM 17.24.106, to prevent aquifer cross contamination, and surface casing cut off below the ground surface. Casing for lysimeters and piezometers would be removed. All areas disturbed by abandonment activities would be scarified and reseeded.

Dated: 09/18/17

Signed: Dan Walsh

Dan Walsh
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Air, Energy, & Mining Division