



March 9, 2016

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*VIA FIRST-CLASS MAIL AND E-MAIL TO [wmccullough@mt.gov](mailto:wmccullough@mt.gov), [hrolfes@mt.gov](mailto:hrolfes@mt.gov)*

RE: Tintina Montana, Inc., Black Butte Copper Project  
Completeness and Compliance of Operating Permit Application

Dear Mr. McCullough and Mr. Rolfes:

These comments on behalf of Montana Environmental Information Center (“MEIC”) pertain to Tintina Montana Inc.’s Application for an operating permit for the proposed Black Butte Copper Project near White Sulphur Springs, Montana (“Application”). Under Montana Code § 82-4-337, the Montana Department of Environmental Quality (“DEQ”) is obligated to evaluate the completeness of the Application and its compliance with applicable statutory and regulatory provisions before it may issue a draft permit. For the reasons identified below and in the expert reports submitted under separate cover by Montana Trout Unlimited, Tintina’s Application omits information necessary to DEQ’s lawful and meaningful review of the project under the Metal Mine Reclamation Act (“MMRA”). Accordingly, DEQ must direct Tintina to fill the considerable gaps in its Application before DEQ further processes the Application.

## I. BACKGROUND

### A. Black Butte Copper Project

The Black Butte Copper Project is situated in the Sheep Creek watershed in Meagher County, Montana. Sheep Creek is a tributary of the Smith River, which in turn is a tributary of the Missouri River. Sheep Creek originates in the Little Belt Mountains at an elevation of approximately 7,600 feet, and discharges into the Smith River about 23 river miles to the west of Black Butte.

The Black Butte Copper Project is located approximately 19 river miles above the confluence of Sheep Creek and the Smith River. Application, App. B at 1-8 (Baseline Water Resources Monitoring and Hydrogeological Investigations Report). The Smith River is vital to central Montana’s tourism economy. The river is Montana’s only permitted recreational river. It is renowned for its spectacular scenery, world-class trout fishing opportunities, and unique and highly coveted recreational float trip experience. The Smith River and its tributaries also provide important habitat and spawning grounds for regional trout fisheries. Sheep Creek and a number of its tributaries, including Little Sheep Creek, Coon Creek, and Black Butte Creek occur within

the area proposed to be mined. Application at 55 & App. B, at 1-8. These streams within the Sheep Creek drainage provide extremely important spawning habitat for trout in the Smith River. Letter from Jeff Hagener, Director, Montana Fish, Wildlife & Parks, to Herb Rolfes – EMB, Montana Dep’t of Env’tl. Quality, Re: Comments of Montana Fish, Wildlife & Parks on the Draft EA for the Tintina Alaska Exploration, Inc. Amended Exploration Permit for the Black Butte Copper Project (Aug. 26, 2013) [“FWP Draft EA Comment Letter”]

Tintina has been engaged in surface exploration on the site since September 2010. App. at 4. Through its “extensive core drilling,” *id.*, Tintina has established 12,749 U.S. tons (11,566 metric tons) of measured or indicated minable copper within the Johnny Lee deposit, *id.* at 15. Although Tintina applied to amend its exploration license to allow for invasive underground exploration activities in November 2012, *id.* at 4, Tintina withdrew that application just three weeks after MEIC and Earthworks filed a lawsuit challenging DEQ’s approval on grounds that it violated the MMRA, the Montana Environmental Policy Act, and the Montana Water Quality Act. Accordingly, Tintina move forward to submit its operating permit application without conducting significant underground exploration.

#### B. DEQ Oversight of Mine Operations

When properly implemented, the MMRA helps to ensure that inherently risky mining operations do not harm the environment and the people who depend on it. In particular, the legislature intended for the MMRA “to prevent undesirable land and surface water conditions detrimental to the general welfare, health, safety, ecology, and property rights of the citizens of the state.” Mont. Code Ann. § 82-4-301(3); *see also id.* § 82-4-301(2)(a) (MMRA intended “to prevent unreasonable depletion and degradation of natural resources”).

DEQ is statutorily and constitutionally obligated to exercise robust oversight of mining operations from start to finish. *See* Mont. Code Ann. §§ 82-4-335 to 341 (providing for DEQ oversight); Mont. Const., art. II, § 3, art. IX, § 1 (requiring state to maintain and improve a “clean and healthful environment”). Before DEQ even undertakes substantive review of a mining proposal, DEQ must ensure that the mine operating permit is complete. Mont. Code Ann. § 82-4-337(1)(a) (“The department shall review all applications for operating permits for completeness and compliance” with applicable statutory and regulatory requirements); *Kadillak v. Anaconda Co.*, 184 Mont. 127, 139-41, 602 P.2d 147, 154-55 (1979) (DEQ has clear legal duty to return deficient operating permit application under Mont. Code Ann. § 82-4-337; failure to do so rendered DEQ’s issuance of subsequent permit unlawful and void). It is imperative that DEQ’s “completeness and compliance” review identify all deficiencies in the Application, as “the department may not in a later notice raise an issue pertaining to the initial application that was not raised in the initial notice. Mont. Code Ann. § 82-4-337(1)(a).

DEQ’s scrutiny of proposed hard rock mining operations is made all the more essential by the inherently risky nature of such activities. As the Bozeman Daily Chronicle recently editorialized, “Mining has a long and checkered history in this state. And the despoiling of water is a major part of that history. Decades of mining from the Berkeley Pit in Butte spawned the largest Environmental Protection Agency Superfund site in the nation. More recent projects have left the state – and its taxpayers – on the hook for cleaning up pollution that pre-mining

clean-up bonding fell short of covering.”<sup>1</sup> Empirical research supports this concern. A detailed study in 2005 found that regulatory agency predictions of water quality impacts during the permitting process vastly underestimated actual water quality impacts at the mines evaluated, as determined based on operational data.<sup>2</sup> While agencies generally relied on the implementation of mitigation measures to justify a low probability of groundwater and surface water impacts, actual impacts were found to reflect more closely the agencies’ discussion of the potential consequences of mine operations without mitigation.<sup>3</sup> Simply put, the agencies’ predictions that mitigation measures would reduce inherent risks to water resources were wrong; in fact, those mitigating measures did nothing to measurably protect surface or groundwater quality beyond what would be expected for a mine without such measures in place.

Given this history and the risks inherent in mining a sulfide ore-body in close proximity to sensitive fisheries and waters, DEQ must ensure that Tintina provides a complete and technically sound analysis of the resources at stake and potential impacts of its operations on the Smith River. To that end, DEQ should notify Tintina of the significant deficiencies in its Application as described below and in the separately submitted expert reports.

## II. TINTINA’S APPLICATION OMITTS NECESSARY INFORMATION AND ANALYSIS

Tintina’s Application is incomplete and does not comply with Montana legal requirements because it fails to: examine the full scope of Tintina’s planned mining activities, including on adjacent federal claims; adequately describe existing conditions in the project area; and adequately identify and evaluate necessary mitigation and reclamation to avoid, minimize, and/or repair the project’s impact on the region’s water resources and landscape.

### A. The Application Should Examine the Full Scope of Planned Mining

Tintina has not provided information about environmental baseline conditions, potential mining impacts, and mitigation over the full scope of its planned mining operations. In contrast to the relatively small footprint and 11- to 14-year mine life described in Tintina’s Application, the company has purchased 40 federal mining claims adjacent to the project area and touts to its investors a potential to extend mine life to 50 years over the entire district. Because there is not only the potential, but the intention, to expand mining beyond the scope identified in the Application, DEQ should require Tintina to identify and evaluate the consequences of its long-

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<sup>1</sup> Editorial, Mine permitting requires careful balance, Bozeman Daily Chronicle (Feb. 25, 2016), available at [http://www.bozemandailychronicle.com/opinions/editorials/mine-permitting-requires-careful-balance/article\\_555fb879-e5fb-58f3-bb26-61aa2e52047b.html](http://www.bozemandailychronicle.com/opinions/editorials/mine-permitting-requires-careful-balance/article_555fb879-e5fb-58f3-bb26-61aa2e52047b.html).

<sup>2</sup> See Maest et al., Predicted versus actual water quality at hardrock mine sites: effect of inherent geochemical and hydrologic characteristics, Poster paper presented at the 7th International Conference on Acid Rock Drainage, March 26-30, 2006, St. Louis MO (attached). Maest et al. 2006 summarized the results of a larger study. See Jim Kuipers, P.E., Ann Maest, PhD, Comparison of Predicted and Actual Water Quality at Hardrock Mines: The reliability of predictions in Environmental Impact Statements (Dec. 7, 2006), available at <https://www.earthworksaction.org/files/publications/ComparisonsReportFinal.pdf>.

<sup>3</sup> Maest et al. 2006, at 1136, 1140.

term plans before DEQ may issue a draft permit only for the short-term proposal. Failing to do so would preclude meaningful analysis of the full scope of mining impacts on aquatic and wildlife resources, water quality, and the surrounding landscape.

B. The Application Insufficiently Describes Existing Conditions In and Around the Project Site.

Tintina's Application fails to adequately describe existing conditions at the project site. See Admin. R. Mont. 17.24.116(3)(a). The requirement to obtain and disclose information about existing conditions is an essential element of DEQ's review of the potential impacts of the action, as it provides a baseline against which the project may be compared. C.f. N. Plains Res. Council, Inc. v. Surface Transp. Bd., 668 F.3d 1067, 1085 (9th Cir. 2011) (holding that under the National Environmental Policy Act, complete data on existing environmental conditions is necessary to allow agency to "carefully consider information about significant environment impacts."). Here, Tintina's Application and baseline studies lack essential information about aquatic resources and fisheries, regional hydrology, and geochemical characteristics of the affected area.

1. *Aquatic Resources and Fisheries*

Tintina's Application fails to disclose adequate baseline information regarding the project area's importance to wildlife, particularly fish. As Montana Fish, Wildlife & Parks ("FWP") commented on Tintina's 2013 exploration license application, the Smith River and its tributaries are extremely important for regional trout fisheries. Tributaries in the Sheep Creek drainage (including Sheep Creek, Calf Creek, and Moose Creek) account for over half of tributary spawning of rainbow trout in the Smith River drainage, and rainbow trout have been known to travel nearly 200 miles round-trip to spawn in Moose Creek. See FWP Draft EA Comment Letter at 1-2. Thus, adequate documentation of baseline fisheries data not only is a legal necessity under Admin. R. Mont. 17.24.116(3)(a), it is essential to understanding the ecological significance of the area Tintina proposes to convert to an industrial mining operation.

As documented in the hydrologic report prepared by aquatic ecologist Ken Knudson, the baseline aquatic information presented in the Application is inadequate. First, the baseline report and Application fail to acknowledge or evaluate the importance of Sheep Creek and its tributaries for trout recruitment for both the Smith and Missouri Rivers. While the baseline report provides trout densities based on seasonal sampling efforts, Application, App. G, at 17-19, no effort was made to evaluate or discuss the prevalence of trout spawning and rearing within the relevant streams, nor to place the value of these streams in the broader context of the Smith and Missouri River fisheries. In fact, while not evaluated in Tintina's aquatic baseline study, it appears—based on the high proportion of larger and older brown trout in Sheep Creek relative to younger fish—that Sheep Creek offers important spawning and rearing habitat for Smith River brown trout. Knudson Report, at 4.<sup>4</sup> Where the data suggest that Sheep Creek is vital to the Smith River brown trout fishery, see FWP Draft EA Comment Letter, Tintina's failure to evaluate this potential is a critical deficiency.

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<sup>4</sup> Mr. Knudson's report is available at <http://smithriverwatch.org/wp-content/uploads/2016/02/Aquatic-review.pdf>.

Further, the fish population surveys discussed in the baseline study (Appendix G) were fundamentally flawed. The study offers no rationale for the study reaches selected, including whether the reaches contained representative microhabitat types. Knudson Report, at 3. And Tintina’s consultants apparently failed to ensure that the fish were sampled in a “closed system” by placing barriers at either end of the study reach. *Id.* Both of these flaws undermine the accuracy and usefulness of the estimated population densities reported in Appendix G.

In addition, the baseline aquatic study presents insufficient baseline data. Tintina’s consultants began collecting data in Fall 2014, and presented, at most, one year of baseline monitoring collected over three visits. Tintina offered no justification for its reliance on a single year of baseline aquatic data, where conditions may change significantly from one year to the next. For Sheep Creek—the most important surface water in the project area—the baseline study report reported even less data. Tintina’s consultant failed to conduct any fish sampling in Sheep Creek during its Spring 2015 visit. Application, App. G, at 6. Particularly for migratory fish species like trout, population data may change significantly from season to season. While spring sampling was apparently precluded by the early spring runoff in 2015, *id.*, Tintina’s response should not have been to submit a baseline aquatic report that lacks a full year of data respecting the most important fishery in the project area. DEQ should require Tintina to provide additional baseline aquatic data or justify why such data is unnecessary.

The Application also failed to discuss the sufficiency of stream flows in Sheep Creek and its tributaries to support fisheries. FWP previously informed DEQ that it owns an instream flow water right of 30 cfs for Sheep Creek to ensure minimum flows necessary to sustain fish and wildlife habitat. *See* FWP Draft EA Comment Letter, at 2. Because adequate instream flows often are not met, FWP has called on junior priority right holders to cease diversions. Nowhere does the Application discuss this marginal baseline flow condition, nor does it evaluate the consequences of this condition for area fisheries or water users in the Sheep Creek drainage. Further, because Sheep Creek is a major tributary of the Smith River, the Application should have evaluated the importance of adequate flow in Sheep Creek to the Smith River. FWP also owns instream flow water rights on the Smith, which likewise commonly exhibits insufficient flows to sustain fish and wildlife. *Id.* Because Tintina’s baseline aquatic resources study fails to evaluate or discuss the sufficiency of flows in Sheep Creek and the Smith River, the study is deficient and must be rejected.

## 2. *Hydrology*

The Application also fails in numerous respects to adequately describe hydrologic conditions in the project area. Complete hydrologic information is necessary to meet the MMRA requirements to describe “the existing environment,” Admin. R. Mont. 17.24.116(3)(a), and more specifically, to obtain and disclose “ground water and surface water hydrologic data gathered from a sufficient number of sources and length of time to characterize the hydrologic regime,” Mont. Code Ann. § 82-4-335(5)(k). More fundamentally, Tintina must develop a complete and accurate understanding of the area’s hydrology to ascertain the potential for harmful impacts to ground and surface waters—including both pollution impacts and the potential for dewatering—and to identify measures necessary to avoid those impacts. As described in the separately submitted expert report by Tom Myers, PhD, the Application’s

discussion of hydrologic data is deficient. Dr. Myers evaluated the Application, as well as supporting Appendices A, B, C, K, L & M. Myers Report, at 2.<sup>5</sup> MEIC incorporates by references all of the conclusions documented in Dr. Myers' report, some of which are summarized here.

First, the precipitation data developed for the mine site and used to generate Tintina's conclusions regarding the site-wide water balance are not appropriate. Lacking long-term precipitation data for the project area, Tintina used longer term records from two different sites—Bozeman and Millegan—and effectively applied a ratio to derive precipitation and evaporation estimates for the project area. Application, at 21-24; Myers Report, at 4-5. However, as Dr. Myers reported, the available data for the project area indicate that precipitation events may differ significantly from either the Bozeman or Millegan sites. Myers Report, at 5. There are several possible explanations for this. "Black Butte is more mountainous and therefore may actually have more summer thunderstorm precipitation and more snow; however, an alternative could be that being farther north and farther from a summer source of moisture, there could be less precipitation during the summer." Id. In any event, Tintina did not justify its reliance on precipitation data that do not appear representative of conditions in the project area. Id. This significant defect undermines the usefulness of Tintina's water balance analysis.

Second, the Application's characterization of baseline groundwater and surface water resources is deficient. Tintina commenced baseline monitoring of flow, water levels, and water quality in May 2011. Application, at 26. Since that time, Tintina has conducted quarterly monitoring at most groundwater and surface water sites. Id. The only exception is for three sites on Sheep Creek, which Tintina began monitoring in 2013 on a bi-weekly/weekly basis during spring run-off, followed by monthly monitoring since 2014. Id. As Dr. Myers observed, quarterly monitoring is insufficient to capture temporal variability. Myers Report, at 6. The more frequent monitoring of Sheep Creek is appropriate, but must be expanded to all sites because flow conditions in Sheep Creek may differ from its tributaries due to differences in the watersheds including area, elevation, and aspect. Id. In addition to more frequent monitoring of existing surface water sites, Dr. Myers recommends the addition of at least four additional monitoring sites within Sheep Creek, id. at 7, and a complete a series of synoptic flows measurements on the Smith River between the gaging stations to enable a more accurate estimate of the effect of Sheep Creek flows on the Smith River.

The Application also fails to include data from a sufficient number of groundwater monitoring and pumping wells. Id. at 10. Tintina collected data from four sets of paired monitoring wells, 10 aquifer test wells, and twelve piezometers in the alluvial/colluvial systems of Sheep Creek, Coon Creek, and Dry Creek. Application, at 38. This monitoring system is inadequate. While the Application attempted to estimate hydraulic gradient, there are insufficient data to accurately predict groundwater flow paths, either horizontally or vertically, or to calibrate a numerical groundwater flow model. Myers Report, at 10, 14. Tintina's failure to obtain adequate baseline groundwater data in turn rendered its numerical groundwater model unreliable. This lack of data "may severely limit the ability of the model to accurately predict dewatering rates and the effect dewatering has on streams." Id. at 14.

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<sup>5</sup> Dr. Myers' report is available at <http://smithriverwatch.org/wp-content/uploads/2016/02/Hydrologic-review.pdf>.

Not only is Tintina's numerical groundwater model based on inadequate baseline data, it relies on fictitious estimates of baseflow and recharge. Baseflow is the portion of stream flow derived from groundwater recharge. Rather than actually calculating baseflow, Tintina made an assumption that it would equal wintertime low flow. *Id.* at 2, 16. Tintina further assumed that recharge would be equal to baseflow – 10 percent. Neither assumption is supportable. Tintina's assumption that baseflow equals annual low flow fails to account for additional baseflow during wet periods when "groundwater may discharge to the stream at much higher rates than it does during low flow or dry periods." *Id.* at 16. Further, Tintina's assumption that recharge is a consistent percentage of annual precipitation across the model domain does not account for varied geology across the project area, discounts higher recharge rates at times when precipitation is relatively greater, and ignores recharge from mountainous runoff. *Id.* at 2, 16-17. Dr. Myers concludes that Tintina must recalculate recharge based on accurate baseflow estimates, and refine its model to distribute recharge appropriately based on site-specific geology, precipitation, and other factors. *Id.* at 17. Without such modifications, Tintina's numerical groundwater model does not offer reliable flow and dewatering predictions.

For these and other reasons detailed in Dr. Myers' report, the Application's hydrologic analyses are incomplete and insufficient "to characterize the hydrologic regime" of the project area. Mont. Code Ann. § 82-4-335(5)(k). As a result of these deficiencies, Tintina's operating and mitigation plans also are deeply flawed. Accordingly, DEQ should reject not only the baseline hydrologic analyses, but also the operating and mitigation plans that are based on those analyses.

### 3. *Geochemistry*

Tintina's Application also fails to adequately analyze geochemistry in the project area, undermining any conclusions regarding the potential of the Black Butte Copper project to generate harmful acidic runoff and other ground and surface water pollution. These deficiencies are described in the separately filed comments of Kendra Zamzow, PhD. As Dr. Zamzow concluded, the Application's failure to adequately analyze geochemistry of the host rock and ore, and the long-term potential for water penetration into the cemented tailings facility ("CTF"), undermined the Application's conclusions regarding metal mobility, the range and concentrations of metals in wastewater and extracted groundwater, and the consequences for requisite mitigation. Zamzow Report, at 6.<sup>6</sup> These comments summarize some of the most egregious geochemical data insufficiencies raised in Dr. Zamzow's Report.

Tintina's attempt to address the impacts of metal leaching from its tailings falls short. Tintina proposes to store all of its waste rock and the majority of tailings generated over the 13-year active life of the mine at the CTF. Application, at 75, 178. Covering 71.9 surface acres, the CTF has a storage capacity of 5.6 million cubic yards, or 6.9 million tons of cemented tailings and 1.9 million tons of waste rock. *Id.* The tailings will be placed in a 0.5 to 2 percent cemented paste. *Id.* at 276. The cement paste provides structural stability, but does not prevent acid generation or metal leaching. Zamzow Report, at 3. Tintina concedes that using 2% cemented

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<sup>6</sup> Dr. Zamzow's report is available at <http://smithriverwatch.org/wp-content/uploads/2016/02/Geochemistry-and-water-treatment.pdf>.

paste does nothing to prevent metal release from tailings as soon as 8 weeks after disposal as a result of “disaggregation.” Application, at 71. In fact, even with 4% cement paste cement as backfill, Tintina identified groundwater exceedances for copper, nickel and thallium in effluent, and “4% cemented paste with waste rock exceeded the groundwater quality standard for thallium in all weeks of testing thus far.” Id.

Moreover, although Tintina speculates that the cemented paste blocks are “unlikely to disintegrate,” Application, at 276, Tintina failed to perform the necessary humidity cell testing to understand the time it will take for contaminants to leach with this binder. Zamzow Report, at 2. Tintina’s Application expressly states that for unsaturated and unamended tailings, humidity cell testing demonstrated that “metal release potential was high, with regular groundwater exceedances observed for numerous constituents.” Application, at 71. In addition, there is potential for wetting/drying cycles within the CTF to affect seepage water quality, yet Tintina failed to perform any modeling to evaluate this possibility. Zamzow Report, at 2.

Furthermore, Tintina failed to fully analyze the potential seepage of heavy metals, particularly thallium, from cemented tailings used as backfill in tunnels. See Zamzow Report, at 2; Application, at 1 (“Approximately 45% of the mill tailings will be mixed with cement to form a paste, and used to backfill all production workings during the mining of sequential drifts.”). As Dr. Zamzow found, “from testing that has been done to date, cemented tailings backfill in tunnels could release thallium or arsenic (and potentially some copper or nickel) into groundwater, as uncaptured seepage; waste rock seepage could release strontium and thallium above surface water and groundwater criteria (from USZ lithology) and thallium above surface water criteria (Ynl and Ynlb lithologies).” DEQ must require Tintina to evaluate the potential impacts of this seepage.

Tintina also failed to perform humidity cell testing for the full range of host rock and ore in the project area. The company only presented long-term (80 weeks) humidity cell data for the host rock that is likely to be the least problematic with respect to metal leaching (Ynl and Ynlb material from 2012). There has been insufficient testing of the Upper Sulfide Zone, and the Middle Sulfide Zone, Lower Sulfide Zone, and Lower Copper Zones do not appear to have been tested at all. Zamzow Report, at 2-3.

Further, while Tintina suggests that excavated Ynl and Ynlb rock may be used for construction material, the Application failed to examine the potential for construction rock to leach contaminants and contaminate surface water. See id. at 5.

DEQ should require Tintina to provide additional baseline data and analysis regarding geochemistry issues associated with the project. Unless and until Tintina provides such additional information, DEQ cannot evaluate either the potential water quality impacts from the mine or the adequacy of Tintina’s proposed mitigation measures.

#### 4. *Soils Chemistry*

Although the Application includes a baseline soils report (Appendix D) that describes the chemical and physical properties of soils in the project area, the analysis is incomplete with respect to the mobility of metals in the soil when saturated due to mine operations. Tintina



proposes to discharge treated water through an “underground infiltration gallery” to shallow bedrock, Application, at 2, and a seasonal “land application disposal” (“LAD”) system, *id.* at 210. The Application does not contain adequate information or analysis to demonstrate the ability of either system to prevent pollution of water resources. In particular, the Application discloses that the soils in the project area contain metals—including aluminum, barium, copper, iron, and manganese—that may be “mobilized” when saturated. *Id.* at 82. In evaluating the underground infiltration gallery and LAD system, however, Tintina does not appear to have evaluated the potential impacts of saturated metals migrating outward from these two areas. Instead, the Application simply states that “it is not clear whether in-situ conditions would result in concentrations exceeding pertinent standards in run-off or seepage from LAD areas or underground infiltration galleries.” *Id.* This information gap renders Tintina’s discussion of these key operational measures incomplete.

### C. Tintina’s Evaluation of Mitigation Measures is Deficient

Tintina’s failure to provide sufficient information about the existing aquatic resources, hydrology, geochemistry, and soils within the project area in turn undermined the Application’s discussion of measures to prevent harmful mine impacts. *See* Mont. Code Ann. § 82-4-335(5)(m) (requiring description of “remedial action plans to be used to control and mitigate discharges to surface or ground water”). DEQ must require additional information and analysis to rectify these shortcomings before it may evaluate the sufficiency of Tintina’s proposed mitigation measures, but Tintina’s evaluation of the mitigation measures themselves is deficient and requires re-analysis. In particular, as described below, the Application fails to propose and evaluate an appropriately sized and engineered wastewater treatment plant, sufficiently protective measures to assure that the CTF for tailings and waste rock does not harm water quality, and an adequate reclamation plan.

#### 1. *Wastewater Treatment Plant*

While the Application relies on the operation of a Water Treatment Plant to avoid degrading or polluting water resources, the Application fails to identify and plan for an adequate facility to ensure these imperatives are met. *See* Application, at 219 (“Approximately 60% of the water produced from underground will not be put to any beneficial use, and will be treated to meet non-degradation standards and discharged back to groundwater.”). Groundwater pumped from the decline to facilitate mining will contain harmful levels of pollutants, including thallium, arsenic, and antimony at concentrations that exceed human health standards. Application, at 44. According to the Application, a portion of the groundwater removed from the decline (210 gpm) will be used as make-up water for mine operations, Application at 275, with the remainder being sent for treatment at the Water Treatment Plant prior to discharge to underground infiltration galleries, *id.* at 116. Although the Application predicts the volume of groundwater requiring treatment as 290 gpm, *id.* at 275, “short-term higher flows generated by rapid dewatering of fracture systems encountered by mining could be as high as 1,000 gallons per minute,” *id.* at 116. The Water Treatment Plant has insufficient capacity to treat such high volumes of water. The plant will be designed to treat 510 gpm, with two reverse osmosis (RO) units each able to treat 255 gpm. *Id.* at 275; Zamzow Report, at 6.

Although Tintina proposes to use pressure grouting to reduce high flows when they are encountered, Application, at 116, the Water Treatment Plant lacks capacity to treat high volumes of water if grouting is unsuccessful or requires time to implement. See id. Tintina must provide additional information to guard against this possibility. See Kuipers Report, at 2.<sup>7</sup> In particular, Tintina must identify and evaluate different pressure grouting techniques, including case-study information on different techniques and contingency plans. Id. More fundamentally, given the potentially significant consequences of excessive inflow, Tintina must engineer and fully analyze a larger treatment system to conservatively mitigate potential pollution impacts from groundwater removed from the mine. See Zamzow Report, at 6; Kuipers Report, at 2.

Furthermore, it is unclear from the Application whether the proposed “vibratory” treatment system for reverse osmosis reject water is technically proven. Zamzow Report, at 6; Kuipers Report, at 7-8. Tintina must evaluate the effectiveness of this system, its advantages and disadvantages, and conduct a geochemical evaluation of the RO reject water to be treated. Zamzow Report, at 6; Kuipers Report, at 7-8.<sup>8</sup>

Unless and until Tintina supplements its Application to include additional information about this key mitigation, DEQ must reject the Application as incomplete and noncompliant.

## 2. *Tailings Treatment and Impoundment Design*

The Application is also insufficient to ensure that water resources will not be harmed by water discharges from the CTF, where tailings and waste rock will be disposed. In particular, the Application fails to provide sufficient analysis or design information to ensure that the CTF will adequately impound acid-generating material and leachate containing heavy metals and other pollutants.

At the outset, Tintina has not complied with legal requirements pertaining to independent review of its tailings storage facility. Montana law requires Tintina to submit a design document for any tailings storage facility, Mont. Code Ann. § 82-4-335(5)(1), and to obtain and submit a report from an independent panel charged with “review the design document, underlying analysis, and assumptions for consistency with this part. The panel shall assess the practicable application of current technology in the proposed design.” Id. § 82-4-337. The project engineer must then “modify the design document to address the recommendations of the panel and shall certify the completed design document.” Id. § 82-4-337(10). Tintina’s apparent failure to obtain the necessary review report and submit a final design report reflecting necessary modifications to the CTF, if necessary, renders the Application incomplete and noncompliant with respect to the CTF, regardless of any analysis put forward by Tintina and its consultants in the Application.

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<sup>7</sup> Mr. Kuipers’ report is available at

<http://smithriverwatch.org/wp-content/uploads/2016/02/Technical-review.pdf>.

<sup>8</sup> Tintina additionally states that “[p]redictive models of water quality in the underground workings during operations and at closure, on the waste rock stockpile, and in the tailings impoundment sump are also being developed and will be reported at a later time.” Application at 68. DEQ must require that such models be completed before it may approve the completeness and compliance of Tintina’s application.

Further, the Application omits key information about the ability of the CTF to prevent harmful discharges from the CTF to groundwater and surface water. First, the Application discloses that “[i]t is anticipated that the CTF cut will extend below the groundwater table.” Application, at 130. To address the potential problems that groundwater intrusion may have for liner integrity and seepage rates, Tintina states that “care will need to be taken during design, layout and construction of the foundation drain system to control site drainage.” *Id.* However, the Application fails to demonstrate the feasibility of a foundation drain system on the scale proposed by Tintina, including case studies of effective implementation. Tintina must provide additional information to enable DEQ to evaluate the potential impacts from groundwater intrusion. *See* Kuipers Report, at 1, 5.

Second, Tintina has not fully evaluated the potential for leakage from the CTF. Tintina proposes to line the STF with two layers of 100 mil HDPE geomembrane with a layer of high-flow geonet sandwiched in between. Application, at 152. However, all liners leak, particularly through improperly welded seams and other defects. The Application purported to model potential seepage using Giroud and Boneparte (1988). *Id.* The “Giroud leakage equation” is industry standard, and is designed to employ empirically-derived defect size and occurrence rates. Giroud assumed that a well-installed liner would exhibit 1-2 defects per acre, *id.*, each with a size of approximately 1 sq. cm, Giroud *et al.* (1994). In contrast with this industry standard practice for good liner installations, Tintina’s Application improperly assumed 1 defect per hectare, each only 2 mm in size. Application, at 153. Tintina must conservatively analyze leakage rates assuming more and larger defects. *See* Kuipers Report, at 7. In addition, the Tintina must supplement its Application with an evaluation of the potential for the CTF liner to breakdown over time. *Id.*

In addition to leakage through defects and liner breakdown that are inherent for any geomembrane liner, leakage may occur through post-installation damage to the liner. In particular, deer or other wildlife may cause damage when walking on the liner, and rodents may bore holes through the side of the impoundment—including underground in areas not apparent through a visual inspection. As part of the requisite “description of proposed risk management measures for each facility life-cycle stage, including construction, operation, and closure,” Mont. Code Ann. § 82-4-376(2)(x), the Application must identify measures to prevent wildlife access to the CTF, including a rodent-control program, and a sufficiently robust inspection protocol.<sup>9</sup>

Third, the CTF described in the Application requires perpetual care and maintenance. The Application should be revised to evaluate a full suite of options to reduce or eliminate long-term acid-generation potential within the CTF. Kuipers Report, at 1. Mr. Kuipers’ report describes one such option, which involves a process to separate pyrite from the mine tailings for

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<sup>9</sup> The Application promises that a “Tailings Operations, Monitoring and Surveillance (TOMS) Manual will be prepared for all of the waste and water management systems (WRS, CWP, PWP and CTF).” However, without the manual, DEQ is unable to ascertain the effectiveness of waste management systems—particularly the CTF—to prevent water resources impacts. Accordingly, and consistent with Mont. Code Ann. § 82-4-379, Tintina must submit the requisite TOMS manual with its revised Application and prior to DEQ’s issuance of any draft permit.

return to the mine for long-term storage below the water table. *Id.* Lacking any evaluation of such options for a critical mine impact, Tintina’s Application is incomplete.

### 3. *Reclamation Plan*

In addition to the insufficient analysis of mitigation measures during mine operations, the Application fails to include an adequate reclamation plan to mitigate post-operational impacts to the project-area landscape. The reclamation plan is a major component of any mine operating permit application. *See* Mont. Code Ann. §§ 82-4-335(5)(c), 82-4-336. Here, the 14 pages in Tintina’s permit Application apparently constituting the reclamation plan is incomplete and unapprovable. *See* Application, at 290-304.

At the outset, the Application fails to provide for timely reclamation of disturbed areas both during operations and after mining has ceased, in violation of relevant law. Montana law requires “that reclamation activities must be completed not more than 2 years after completion or abandonment of the operation on that portion of the complex,” absent specific authorization from DEQ. Mont. Code Ann. § 82-4-336(3). However, while the statute requires reclamation of any “portion of the complex” in which mining is complete contemporaneous with ongoing mining, the Application states that “[r]eclamation of disturbed areas will be carried on throughout operations to the maximum extent practicable.” Application, at 290 (emphasis added). Tintina’s failure to commit to timely, contemporaneous reclamation is inconsistent with Mont. Code Ann. § 82-4-336(3). Further, this provision reflects both the necessity for prompt post-mining reclamation and identifies the period of time (two years) deemed suitable for most operations. Contrary to this requirement, the Application states that long-term reclamation of the site will commence within one year after a decision to permanently close the mine and will take 2-3 years to complete. Application, at 304. Absent any demonstration of extenuating circumstances, it is improper for Tintina to plan for a longer reclamation time frame than provided by statute. Accordingly, the reclamation plan fails to comply with Mont. Code Ann. § 82-4-336.

The reclamation plan fails to describe the need for measures to reclaim baseflow impacted by mine operations mine closure. The Application asserts that “[t]here are no measureable effects to stream base flow resulting from mine dewatering either operationally or during closure. There are no model predicted effects to stream base flow 20 years after mining has stopped.” Application, at 296. However, because the Application improperly determined baseflow as described above in Part II.B.1, these statements cannot be confirmed. DEQ may not accept Tintina’s reclamation plan unless and until Tintina accurately calculates baseflow and ascertains the need for reclamation activities to restore natural baseflow to Sheep Creek and its tributaries.

The reclamation plan includes insufficient detail regarding necessary post-closure monitoring of the CTF. Specifically, Mont. Code Ann. § 82-4-377 in turn requires the establishment of “[a]n independent review panel shall review the design” of any tailings storage facility. In turn, Mont. Code Ann. § 82-4-336(13) requires that a reclamation plan include “the requirements for postclosure monitoring of a tailings storage facility agreed to by a panel pursuant to 82-4-377.” The Application provides no indication that an independent panel has even been established, let alone that it has reviewed the design of the CTF or other long-term storage facilities and recommended monitoring. To comply with Mont. Code Ann. §§ 82-4-336

and 82-4-377, the reclamation plan must be amended to include findings and recommendations of an independent review panel with respect to all proposed tailings storage facilities.

Further, the Application fails to provide sufficient details on long-term reclamation of the project area relative to revegetation establishment, site operations and maintenance, and water quality monitoring. Kuipers Report, at 10-11. In a revised reclamation plan, Tintina must estimate the periods for monitoring and long-term maintenance, as well as the long-term reclamation costs and environmental risks. Id.

The Application must also estimate the cost of post-closure reclamation, maintenance, and monitoring activities for purposes of establishing an appropriate bond amount. Although MEIC agrees that “DEQ is responsible for calculating the amount of performance bond for reclamation of the Project,” Application, at 305, Tintina must provide detailed, site-specific cost estimates for post-operational reclamation and long-term treatment. As recommended by Mr. Kuipers, Tintina may employ the Standard Reclamation Cost Estimator (SRCE) model developed by SRK and long-term cost calculations using standard engineering methods. Kuipers Report, at 11.

### III. CONCLUSION

For all of these reasons and those identified in the separately submitted reports of Ken Knudson, Tom Myers, PhD, Kendra Zamzow, PhD, and James Kuipers, DEQ should determine that the Black Butte Mine Operating Permit Application is incomplete and fails to comply with applicable statutory and regulatory provisions. DEQ should issue a deficiency notice requiring Tintina to submit substantial additional information and analysis, and may not issue a draft permit before Tintina requires with applicable legal provisions.

Sincerely yours,



Jenny K. Harbine

cc: Tom Livers, DEQ Director