TINTINA RESOURCES
TSX.V:TAU | OTCQX:TINTF | www.tintinaresources.com

17 East Main Street
Sulphur Springs, Montana
59645
Tel: (406) 547-3466
Fax: (406) 547-3719
Web: www.tintinaresources.com
Email: info@tintinaresources.com

PENDING
UU188.350

January 11, 2018

Montana Department of Environmental Quality
Hard Rock Mining Bureau
Operating Permit Section
PO Box 200901
Helena, Montana 59620-0901

RE: Update to Proposed Treated Water Disposition for the Black Butte Copper Project

To: Herb Rolfes

Tintina Montana, Inc. (Tintina) is submitting this letter to clarify proposed activities associated with disposal of treated water at the Black Butte Copper Project (Project). Three Underground Infiltration Galleries (UIGs) were proposed for use in the Mine Operating Permit Application (MOP; dated July 14, 2017) for disposal of treated water from the Project. Two UIGs (central and eastern) were proposed in the upland areas adjacent to, and south and east of the major mine facilities, and one UIG was proposed in the Sheep Creek alluvial groundwater system. A tracer study, testing for connectivity of bedrock groundwater with the surface water system in the eastern upland UIG area was ongoing at the time the MOP was submitted. The lack of injected tracer detection in any monitoring sites at the time of submission of the MOP indicated there was not an immediate and direct connection of infiltrated water to surface waters in the vicinity of the proposed eastern UIG. As noted in the MOP, data from subsequent ongoing tracer monitoring would also be used to develop the formal Montana Pollutant Discharge Elimination System (MPDES) permit application. However, results from this subsequent tracer monitoring detected very small amounts of one of the tracers. As a result, Tintina decided to apply for a permit to discharge only to the alluvial UIG in the formal MPDES permitting process rather than using both the alluvial and upland UIGs as indicated in the MOP. This letter summarizes the results of the tracer study, proposed changes to the disposal of treated water, and the resultant changes to the project surface disturbance acreage.

TRACER STUDY

A tracer infiltration study was conducted in the eastern upland UIG area from October 2016 through December 2017 to evaluate potential groundwater-surface water interaction surrounding the eastern UIG. The tracer test methods and results through February 2017 were summarized in Appendix B-2 of the MOP. At the time of submittal of the MOP (September 2017), neither of the tracers (fluorescein and eosine), which were added to the infiltration trenches, had been detected

at any of the 11 surface water monitoring sites. Tracer monitoring was conducted through direct collection and analysis of surface water samples, and continuous monitoring using activated carbon packets. During ongoing, but subsequent monitoring, eosine was detected on four carbon sample packets that were deployed from September 6th and 7th, 2017 to October 4th, 2017. Three of the carbon packets were from sites on Little Sheep Creek and one from the gravel pit outfall located north of Little Sheep Creek. Neither tracer was detected in the water samples collected at the time the carbon packet samples were deployed or when they were collected.

The concentrations of eosine detected on the carbon packets were very low, ranging between 1.57 and 1.80 ppb in Little Sheep Creek and 0.56 ppb in the gravel pit outfall. The detection of eosine in the gravel pit outfall indicates that a portion of the eosine traveled through the alluvial groundwater system beneath Little Sheep Creek and does not discharge to the creek. The tracer study was designed only to determine the presence or absence of tracer in the surface water resources surrounding the eastern UIG. Therefore, it is not possible to quantify the amount of tracer that discharges to Little Sheep Creek compared to the amount that was transported by the alluvial gravel groundwater system beneath and beyond the creek. Tintina is in the process of preparing a final report on the eastern UIG tracer test program and its results.

UPDATED TREATED WATER DISPOSITION

With the documentation of an eventual connection between tracer-bearing water discharged to the proposed eastern UIG and Little Sheep Creek, Tintina elected to only include an alluvial UIG in their formal MPDES permit application, and by doing so has effectively at this point in time removed the upland UIGs from their proposed action with respect to treated water disposition. The use of the alluvial UIG as the sole discharge point for treated water resulted in a small conceptual change to the alluvial UIG. The new design of the alluvial UIG provides additional capacity for the alluvial discharge and allows for water to be discharged (introduced) to different locations throughout the alluvial aquifer. This will insure proper long-term performance of the system and to allow for partial shut-downs in order for maintenance to be conducted on various portions of the UIG.

The capacity of the alluvial UIG was evaluated by conducting nine falling-head infiltration tests, and numerical modeling analysis to evaluate water mounding in the groundwater system. The infiltration test showed that the Sheep Creek alluvial aquifer exhibits moderate spatial variability though generally consistent infiltration rates for 7 of 9 trenches. The median infiltration rate from the 9 trenches is approximately 2 ft/day, which represents an infiltration capacity per linear foot of trench of about 0.4 gpm/ft. At the median infiltration rate, a minimum of about 1,400 feet of UIG is necessary to dispose of the designed maximum discharge rate of 575 gpm of treated water to the alluvial UIG system. The infiltration testing and analysis is documented in Appendix E of the Integrated Discharge Permit Application Narrative (Hydrometrics, 2017).

A three dimensional numerical groundwater flow model was developed to evaluate the mounding within the alluvial system under ambient conditions (Hydrometrics, 2017). The model encompasses the Sheep Creek alluvial system from approximately 2,700 feet upgradient of where Little Sheep Creek enters the valley to where the alluvial sediment system pinches out at the bedrock canyon near the proposed northern operating permit boundary. The model was calibrated to heads at 11 alluvial piezometers and monitoring wells and stream flows within the alluvial system (including groundwater/surface water interaction). The mounding analysis was conducted by evenly distributing the designed maximum discharge of treated water (575 gpm) to all segments of the alluvial UIG. The model projects the mounding at each arm will be about 2.3 to 3.5 feet. Additional details of the modeling analysis are provided in Appendix F of the Integrated Discharge Permit Application Narrative (Hydrometrics, 2017).

Based on water levels from piezometers in the alluvial system, there is approximately 2 to 3 feet of shallow unsaturated zone within the alluvial system under ambient conditions. The project will discharge excess water from mine dewatering to the currently saturated portion of the alluvial UIG during mining operations. The mine dewatering modeling analysis (Hydrometrics, 2016b) projects there will be 5 to 10 feet of drawdown in the alluvial system during operations. The drawdown within the alluvial system will therefore result in a thicker unsaturated zone of approximately 7 to 13 feet during operations. Based on the projected unsaturated zone in alluvial system during operations, the alluvial system has sufficient capacity for the UIG to manage the maximum discharge rate, without risking a discharge of infiltrated water at the surface prior to discharging to Sheep Creek. The operational water levels are further discussed in Section 3.1 and Appendix F of the Integrated Discharge Permit Application Narrative (Hydrometrics, 2017).

A final design of the alluvial UIG was proposed in the MPDES permit application based on the results from the infiltration testing and modeling analysis (Figure 3.2 of Discharge Permit and attached to this document). The UIG will consist of 14 individual galleries ranging between about 150 and 350 feet in length, 6 feet wide and 15 feet deep (Figure 3.2 attached). Water will be pumped directly from the Water Treatment Plant at a monitored quality that meets non-degradation criteria for groundwater and surface water. Treated water will be discharge through approximately 3,140 feet of perforated HDPE pipe within the individual galleries. Each individual gallery will have a control valve at the main distribution pipeline to allow for controlled application during operations. Tintina is evaluating options for the installation of pressure compensating emitters to insure an even distribution of water along the entire gallery length. The valves will allow water to be switched to different areas to avoid saturation of near surface soils or the formation of downgradient seeps to the surface. Water will be supplied to the UIGs through about 9,777 feet of 6-inch distribution line. The new design of the alluvial UIG is described in detail in the Integrated Discharge Permit Application Narrative (Hydrometrics, 2017).

CHANGES IN SURFACE DISTURBANCE

The total surface disturbance from installing three UIG areas is reduced overall due to the elimination of two upland UIGs and the expansion of the alluvial UIG in the MPDES permit application. The elimination of two upland UIGs reduces the projected surface disturbance by 13.7 acres (see Table 3-13 of MOP). The expansion of the alluvial UIG consists of 9,427 feet of excavated distribution line (850 feet within mill disturbance area), 350 feet of distribution line that will be installed with jack and bore methods beneath wetlands, and 3,140 feet of infiltration galleries. A 20-foot construction disturbance width was assumed for the excavation of the distribution line and infiltration galleries. The surface disturbance area for the different components of the alluvial UIG is 5.4 acres (summarized in Table 1).

Table 1. Underground Infiltration Gallery Surface Disturbance

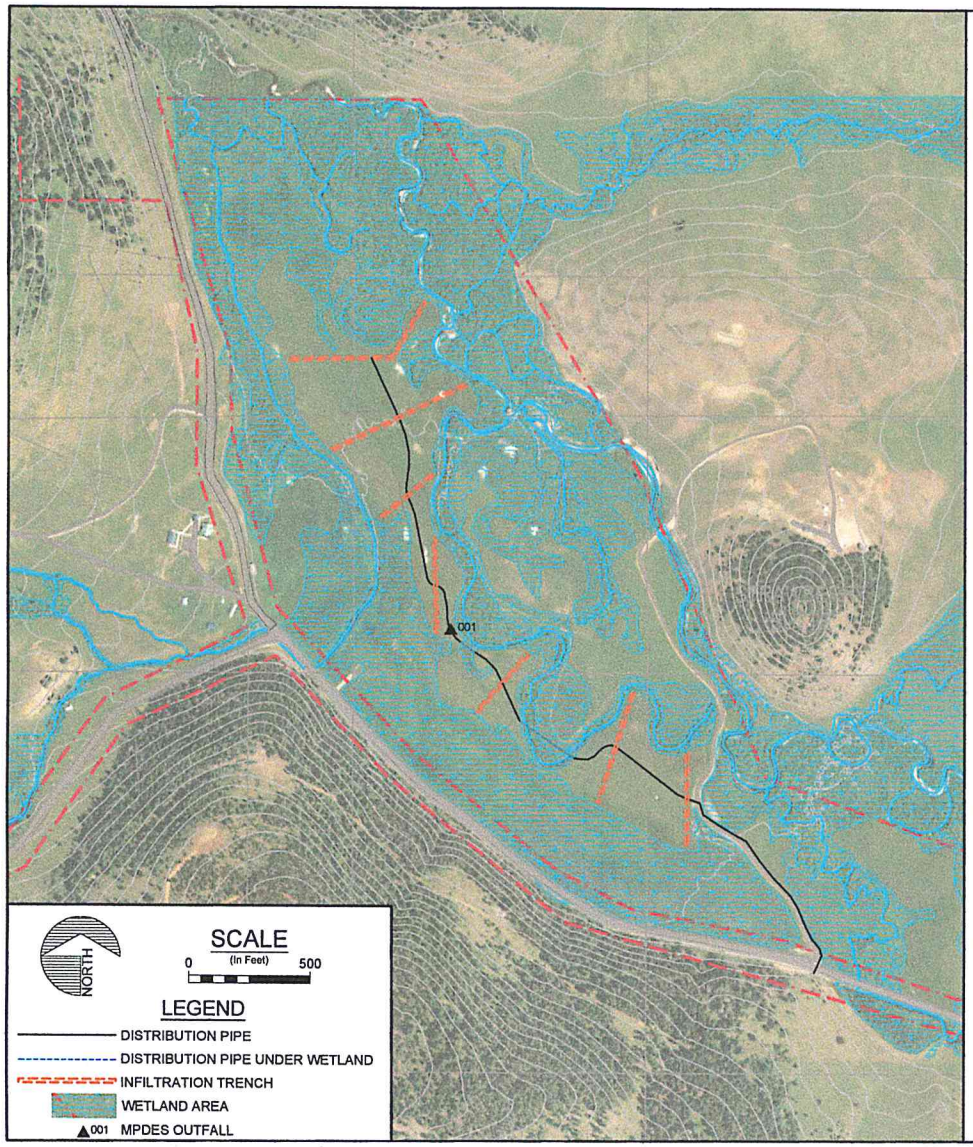
Facility	Linear Feature (feet)	Construction Disturbance Width (feet)	Surface Disturbance (acres)
Excavated Distribution Line	8,577	20	4.0
Distribution Line within Mill Pad	850	20	Previously disturbed
Bored Distribution Line	350	0	0
Infiltration Gallery	3,140	20	1.4
		Total	**5.4**

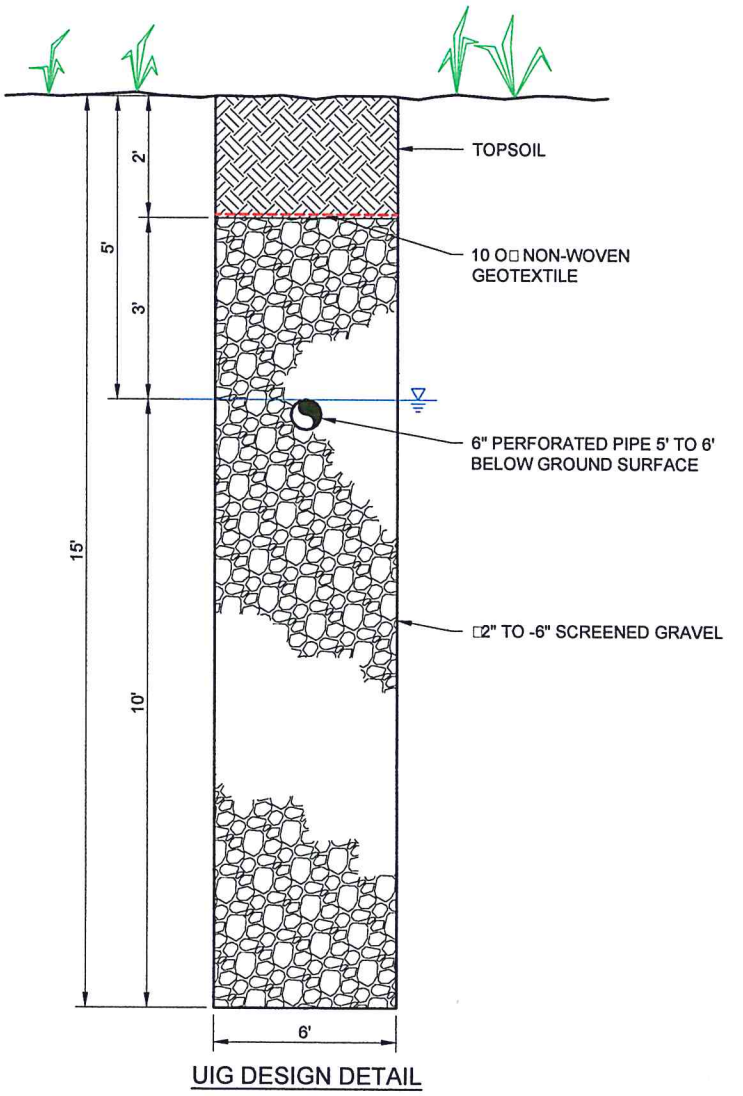
The changes to the proposed UIGs results in 260 acres of surface disturbance for the Project, prior to adding the construction buffer zone and miscellaneous items. The updated total disturbance area for the Project with the construction buffer zone and miscellaneous items (10% of subtotal) is 286 acres. This is a reduction of 10 acres from the 296 acres reported in Table 3-13 in the MOP.

We would be happy to provide any further information as required and thank you for your review of this update.

Sincerely,

John Shanahan
Chief Executive Officer.





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Hydrometrics, Inc.
Consulting Scientists and Engineers

Figure 3.2
Alluvial Underground Infiltration Gallery
Black Butte Copper Project
Meagher County, Montana