



**Date:** April 8, 2021

**To:** Peter Hays, DRMS

**From:** Patrick Lennberg, DRMS

**RE: Gladstone Toll Mill Application; M2021-007, Appendix D - Geochemical Waste Characterization Program Results – Review Memo**

On February 18, 2021, I was requested to review the report *Appendix D - Geochemical Waste Characterization Program Results* produced by Knight Piésold Consulting dated January 14, 2021. The report is part of the permit application package for the Gladstone Toll Mill, M2021-007. Below is a summary of my review.

### **General Review**

1. On Figure 2 there is a Pile 4 located northwest of Pile 3, why was this waste rock pile not sampled?
2. What are the dimensions and approximate volumes of each of the four waste rock piles?
3. In Section 2.1 it is stated that the samples were collected as bulk grab samples. Please provide more details of how this sampling was conducted. Additionally, if the samples were surficial in nature there is the potential of oxidation zoning in the piles where the surface has reacted and the more interior of the pile unreacted. Ideally sampling of the piles should have been done using a 5-point composite and sampling at depth within the pile.
4. There are three historic draining mines with acid mine drainage that have been identified by the Abandoned Mine Lands (AML) within a two mile radius of the site. Two of those mines, Silver Cycle and Big 5 Tunnel, have seen partial to complete restoration and the third site, Rockford, is currently draining. Given the site is located in a known region to produce acid mine drainage, the paste pH values of the piles range from 4.4 to 4.7 and NNP values being between -20 and 20 kg CaCO<sub>3</sub>/ton additional kinetic testing should be completed.
5. The report notes that in the GARD Guide, 2014, that sulfide-sulphur contents of less than 0.1% wt sulphide-S are not considered to be acid generating. Typically this approach is used when the complete mineralogy of the samples and area are well documented. Mineralogical work provides a framework for interpreting geochemical tests. To date the mineralogy of samples and waste rock piles are not well documented. Please recalculate the NNP using the more conservative total sulphide content.



6. While the waste rock samples were tested for leachability. Samples should also be tested using EPA Method 6010 and the results compared to the EPA Regional Screening Levels (RSLs) Summary Table used by CDPHE (May 2020) to determine potential levels of soil contamination at the site. This analysis will help guide what happens to the tailings that come out of the mill.

If you need additional information or have any questions, please let me know.

Sincerely,



Patrick Lennberg  
Environmental Protection Specialist

cc: Jared Ebert, DRMS