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BY EMAIL

March 20, 2015
FILE: 5020-01

MiningWatch Canada
Suite 508, City Centre Building,
250 City Centre Avenue,
Ottawa, Ontario K1R 6K7
Attn: Mr. Ugo Lapointe

Dear Mr. Lapointe,

RE: Harper Creek Project, British Columbia-
Observations on the EIS Pertaining to Hydrogeology and Subsurface Stratigraphy in and around the Proposed Tailings Impoundment

You asked that I review information in the EIS related to the hydrogeology and subsurface stratigraphy in and around the proposed tailings impoundment. I understand the primary concern is the stability of the proposed tailings dam and impoundment. This concern reflects past tailings-dam failures such as Mount Polley and Aznalcollar, due to subsurface conditions.

Please note the primary sources for this information in the Harper Creek EIS are Appendices 5-B, 5-H, and 11-A.

Geological cross-sections through the proposed impoundment area are in Appendix 5-H. Figure 7 of that appendix shows most of the tailings dam on that section will be built over "inferred geology". Thus, the rock geology below the proposed dam is not known and has not been confirmed. Nevertheless, Figure 1.5-8 of Appendix 11-A shows that the main embankment (dam) of the tailings impoundment will rest on or near three (inferred?) different rock units. Such contacts of rock units are potential zones of subsurface instability. In light of the Mount Polley failure, more information should be available now for review and assessment on the underlying rock geology, its fracturing, and its stability.

Furthermore, the tailings-dam failures at Mount Polley and Aznalcollar highlighted the importance of understanding the shallow unconsolidated layers in the "overburden" above the rock. However, figures in Appendix 5-H only show the unconsolidated material as one homogeneous, white-coloured unit less than 1 mm wide. Thus, the primary risk for tailings-dam failure identified at other sites is not addressed by this appendix in sufficient detail.

Despite the lack of graphical information on the shallow material, Appendix 5-B provides some informative text:

> "The southeast portion of the Project Site, the area of the proposed TMF, comprises a broad valley with gentle side slopes in the headwaters of the Harper Creek Catchment. On the valley side slopes, the weathered bedrock is generally mantled by glacial till. The surficial geology on the valley floor was mapped as glacial lake deposits with local organic swamps. Veneers of colluvium were mapped, locally, in the areas of steeper terrain."

Appendix 11-A adds that the glaciolacustrine deposits near the tailings impoundment are silts and clays. Such deposits are more prone to destabilize after dam construction. Thus, there is reason for concern regarding instability of the Harper Creek tailings dam due to inferred and existing subsurface conditions.

Over the 5 km length of the proposed tailings impoundment, most monitor wells were placed near the dam. Within the impoundment area, wells are up to kilometers apart, and thus the hydrogeology of the impoundment area away from the dam is relatively poorly known. In any case, many wells showed upward groundwater gradients. Such gradients can lessen the physical stability of unconsolidated deposits.

Therefore, your concerns for dam stability are well founded. The subsurface stratigraphy and groundwater conditions that can destabilize a dam and cause it to fail are present at the proposed location of the Harper Creek tailings dam.

Sincerely,

Kevin Morin, Ph.D., P.Geo., L.Hydrogeo.
President