



A POSITION PAPER ON PERPETUAL WATER TREATMENT FOR MINES

David M. Chambers, Ph.D., P. Geop.
August 2018¹

Background

The source of the long lasting contaminants in the discharge is usually related to acid rock drainage, but can also be due to a process called metals leaching where contaminants like arsenic, selenium and antimony can leach from exposed rock under neutral or high pH conditions. There has been a shift in the last decade to “wet closures” for mines with acid-generating tailings and waste rock in order to prevent/minimize the amount of contaminated drainage post-closure.

Various federal, state and provincial agencies have the responsibility of issuing permits for the discharge of water and contaminants from mines. Today these agencies routinely grant permits for mining discharges that will require passive, and sometimes active, treatment of the effluent long after the mines have ceased to operate and have been permanently reclaimed. Agencies issuing permits for these long-term, i.e. perpetual, discharges now typically require a financial surety from the mine operator to cover the long term treatment costs of these discharges. However, as experience has shown, there is still financial risk to the public even if a financial surety is required.²

Inherent Risks with Financial Sureties

There are several inherent risks in calculating a financial surety for perpetual treatment, even if the procedure is rigorously and diligently applied.

- 1) There is significant risk in estimating the amount to be covered by the financial surety. It is difficult to estimate long-term replacement and operating costs for a water treatment facility. If the financial surety is insufficient to meet the costs of operating and maintaining the treatment facility, it will almost certainly be the public that is obligated to meet the deficit, or to bear the cost of degraded water quality if treatment is discontinued or degraded.
- 2) When financial sureties are established, an agency must also make assumptions about the average inflation over the period of time covered by the financial surety and the average return-on-investment the financial surety amount will generate over its lifetime. As anyone who follows the financial markets knows too well, there is a considerable amount of instability and risk in both of these assumptions. Typically, changing either the inflation rate or the rate for return-on-investment by a single percentage point will cause a huge change on the required financial surety amount. With a financial surety for perpetual treatment, it is ultimately the public that bears the risk of these assumptions.

¹ Original paper written in June 2000, and revised again in 2007.

² In Montana alone insufficient financial sureties for the Zortman-Landusky and Beale Mountain mines has cost state and federal agencies, and taxpayers, millions of dollars in unanticipated costs.

Long-Term Public Safety versus Financial Risk

Mining-regulatory agencies in at least two states, New Mexico and Michigan, currently ban perpetual water treatment.³ These prohibitions were made prior to the 2014 tailings dam failure at the Mt Polley mine in British Columbia. The Mt Polley Expert Panel,⁴ commissioned to review the accident by the government of British Columbia, brought forth some sobering but well-rationed findings and recommendations.

- 1) The risk to the public from a tailings dam failure is greater to the public, in terms of potential impact, than that from the liability of paying for perpetual water treatment. If a dam fails, there is not only a risk to public safety, but also the liability for cleanup and water treatment.
- 2) Safety in the design, construction, operation, and closure of a dam should be the primary consideration. Safety is not the only consideration, but should be given more weight than financial, environmental, or social factors, because the potential consequences of a dam failure are greater than other risks. There is no prevention of acid or neutral drainage if the impounding structure fails. If a dam failure occurs then acid drainage can be both widespread and uncontained, and there is a significant risk to public safety.
- 3) All waste closures should be dry closures, unless it can be clearly demonstrated that a wet closure is safer than a dry closure. Conventional wisdom today says that wet closure is the best way to prevent acid drainage. While I agree, there is also an unstated assumption that the retaining tailings dam will not fail. Long-term dam safety cannot be assumed with any demonstrable degree of surety. In fact, it is more conservative to assume that the dam will fail at some point, and that ensuing damage to susceptible environmental, social, and financial resources will occur.

Maintaining potential acid-generating material in a dry state is preferable from a stability standpoint, and the acid-drainage which results should be managed and minimized. Although managing acid-drainage long-term still poses the risks to the public that risk is financial, while the risks associated with a failed tailings dam include loss of life, environmental destruction, and the cost of a cleanup.

As a result of the Mt Polley accident, conventional wisdom behind tailings dam management should shift. Safety in the design, construction, operation, and closure of tailings dams should be the first priority, as it is with conventional water supply reservoir dams. Dry tailings are safer than wet tailings, both during operation and closure. Dewatered tailings are a must on closure unless it can be clearly demonstrated that wet closure poses less long-term risk to the public than dry closure.

#####

³ See the New Mexico Mining Act at Chapter 69 - Mines, Article 36 Section 69-36-12-B; and, Michigan's Non-Ferrous Mining Statute and Rule (Part 632). Part 632 consists of Sections 63201 to 63223 (the "Act") and Parts 1 to 6 of the promulgated rules (the "Rules") R. 425.409(b)

⁴ Expert Panel 2015. Report on Mount Polley Tailings Storage Facility Breach, Independent Expert Engineering Investigation and Review Panel, Province of British Columbia, January 30, 2015