Probability of Downstream Inundation Areas based on Probabilistic Tailings Dam Breach Release Volumes

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ABSTRACT

Water and tailings dams are among the largest engineered structures on earth. Consequences of failure can be catastrophic to communities, people, infrastructure, and the environment. Dam breach and inundation studies of credible failure modes are routinely undertaken to support emergency response planning and preparedness, to estimate populations at risk, support dam consequence classification, and support the development of risk management solutions. All of which is challenging due to the multiple scenarios used in the analysis (varying failure modes, pond levels or breach geometries), none of which are typically associated with a probability of failure. Furthermore, is it typical for the tailings dam breach and runout analysis to be conducted on conservative assumptions, which are appropriate to support emergency response or dam consequence classification; however, these assumptions may not define appropriately the downstream risk given their low likelihood of occurrence.

A previously published paper has developed a risk screening-level tool, which applies probability distributions of tailings dam breach volumes based on the failure mode. The current work, and focus of this paper, is to advance that work and develop a screening-level probabilistic runout model that provides a likelihood to downstream elements at risk. The ultimate goal of this work is to identify the failure modes associated with the highest downstream risk, , which will inform the assumptions to be used in a detailed tailings dam breach assessment to support risk-informed decision making moving forward.