Land Application Disposal System Design for Biochemical Reactor Treated Effluent[1]

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Abstract: Biochemical Reactors (BCRs) are becoming a more accepted technology for treatment of mining influenced water (MIW) by regulators and site owners; however, some issues remain under certain conditions with consistently meeting strict effluent discharge standards to surface water systems. These include primary metals standards and secondary standards that may apply for sulfide, biological oxygen demand (BOD), and nutrients that can be in BCR treated effluent. These secondary constituents can be problematic for aquatic systems. Post-treatment systems consisting of aeration ponds, channels, and wetlands can help to attenuate these secondary constituents; however, adequate space at remote mountainous sites may sometimes not be available, and/or there are seasonal limitations to reliance on wetland-based systems. Land application disposal (LAD) systems could be applied in these cases, which avoid direct surface water discharges and rely on surface and subsurface attenuation of secondary constituents. At the mine waste repository for the Upper Tenmile Creek Mining Area Superfund Site, Montana, collected leachate water has been managed in an active water treatment plant and pilot BCR system, with disposal to a LAD system since 2003. In 2018, design was completed for a full-scale leachate passive treatment system utilizing parallel BCR cells, post-treatment settling, aeration, limestone channels, and a gravity-operated LAD system. It is anticipated that the new system construction will begin in 2019, and the existing water treatment infrastructure is planned to be decommissioned in after the new system is operational and functional. This paper will present the critical passive treatment design components and provide details of the pre-design investigation and design approach for the LAD system, including field siting for the LAD, test pits, soil lithology logging, permeability testing, soil metal sorption studies, metal sorption capacity and water balance calculations, and hydraulic design of the LAD.[3]

Additional Key Words: mining influenced water, passive treatment, BCR post-treatment.

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1. Oral paper presented at the 2019 National Meeting of the American Society of Mining and Reclamation, Big Sky, MT. Welcome Back to Montana: The Land of Reclamation Pioneers, June 3–7, 2019. Published by ASMR, 1305 Weathervane Dr., Champaign, IL 61821.

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3. Work reported here was conducted near 46°25'17.04"N, 112°17'32.05"W.