Mine Drainage Co-Treatment in Municipal Wastewater Sequencing Batch Reactors[1]

C.D. Spellman Jr.*, W.H.J. Strosnider, T. Tasker, B. Roman, and J.E. Goodwill[2]

Abstract: Acid mine drainage (AMD) and municipal wastewater (MWW) are pollutants that each pose serious risks to water quality if left untreated. MWW can introduce pathogenic microorganisms into downstream freshwaters while AMD discharges may result in downstream acidification and increased metal loadings that are harmful to aquatic organisms. MWW and AMD are commonly co-occurring wastes in portions of the United States with mining histories. Many drainage discharges, and operating mines exist near MWW treatment plants making it economically feasible to convey mine drainage to MWW facilities. Treating AMD at existing wastewater treatment plants could represent an innovative, sustainable, and economically viable solution for mine drainage reclamation. As many wastewater facilities are struggling to meet new regulations for nutrient removal, co-treatment could offer a low-cost, sustainable option for improving nutrient removal at existing activated sludge plants. Results presented will address existing research questions related to feasibility of mine drainage co-treatment which currently prohibits commonplace adaptation at scale. Synthetic AMD of various strengths will be co-treated with synthetic MWW in a continuously operating (24 hr./day) bench-scale (~2-liter) sequencing batch reactor (SBR) activated sludge treatment system. The treatment system replicates addition of AMD after aeration but before secondary settling. SBR's will co-treat for approximately one month, where clarified effluent and settled sludge quality will be monitored over time to determine impacts of co-treatment relative to traditional wastewater treatment performance. Key parameters will include pH, residual metals, biochemical oxygen demand, nutrients (nitrogen and phosphorus), and suspended solids. MWW operational implications and sludge disposal considerations will also be considered.

Additional Key Words: Combined treatment; Novel mine water treatment.

---

1. Oral presentation presented at the 2022 National Meeting of the American Society of Reclamation Sciences, Duluth, MN. June 12-16, 2022. Published by ASRS; 1305 Weathervane Dr., Champaign, IL 61821.

2. Charles D. Spellman Jr. (*presenter), PhD candidate, and Joseph E. Goodwill, Assistant Professor, Civil and Environmental Engineering, University of Rhode Island, Kingston, RI 02881; William H.J. Strosnider, Director; Belle W. Branch Marine Field Laboratory, University of South Carolina, Columbia, SC 29208; Travis Tasker, Assistant Professor, and Benjamin Roman, Postdoctoral Fellow; Environmental Engineering, Saint Francis University, Loretto, PA 15940.