

# Overcoming matrix effects in acid mine drainage samples analyzed for metal concentrations by ICP-OES<sup>1</sup>

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**Abstract:** Acid mine drainage (AMD) samples are subject to matrix effects when analyzed for metal concentrations by ICP-OES. Fortunately, the matrix effect can be minimized by proper sample preparation. This work aimed to determine the best way to prepare and analyze an AMD sample for analysis by ICP-OES such to obtain the most accurate results. An AMD sample was collected from Cambria County, PA and sent to five different certified labs in Pennsylvania where it was analyzed for Fe, Al, Mn, alkalinity, and acidity. The same sample was analyzed at Saint Francis University for metal concentrations on an ICP-OES using several different methods: 1) dilution prior to analysis, 2) no dilution and spiking with an internal standard prior to analysis, and 3) no dilution and no internal standard added prior to analysis. Results from the certified labs were compared to each other as well as the analyses at SFU to determine expected error in reported metal concentrations of AMD samples. Determined concentrations from the different analysis methods as SFU were also compared to the most probable concentrations reported by the certified labs. Preliminary testing at SFU indicated that diluting AMD samples by a factor of 10 and spiking them with Yttrium was found to give the most accurate results when compared to the most probable concentrations reported by the certified labs. At this dilution, the concentration of the matrix was diluted enough to overcome matrix interferences, and the analyte was concentrated enough to avoid reaching the detection limits of the equipment.

**Additional Key Words:** Mine Drainage Residuals, Phosphorus Removal, Manure, Reduced Nutrient Runoff

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1. Poster presented at the National Meeting of the American Society of Reclamation Sciences, Duluth, MN. June 12– 6, 2022. Published by ASRS; 1305 Weathervane Dr., Champaign, IL 61821.
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