Geochemical and isotopic evidence for geogenic molybdenum in southeastern Wisconsin

JENNIFER S. HARKNESS[1,2] THOMAS H. DARRAH[1] AVNER VENGOSH[2]

[1] *School of Earth Sciences, The Ohio State University, Columbus, OH 43210, USA*

[2] *Division of Earth and Ocean Sciences, Duke University, Durham, North Carolina 27708*

Molybdenum (Mo) is an essential trace nutrient but can have negative health effects at high concentrations [1]. Coal combustion residuals (CCRs) are enriched in Mo, and present a potential anthropogenic contamination source [1]. In this study, we apply diagnostic geochemical tracers and groundwater residence time models to investigate the sources of Mo in a shallow carbonate aquifer in a region of widespread CCR disposal. Mo concentrations exceeding the EPA maximum contaminant level of 40 μg/L were observed in deeper, older groundwater. The boron and strontium isotope signatures in the Mo-rich wells were distinctly different from coal ash-impacted water. The groundwater geochemistry combined with mean groundwater residence times of more than 300 years for groundwater with high Mo concentrations supports a geogenic source of Mo to the groundwater. This study demonstrates the utility of a multi-isotope approach to distinguish natural sources of groundwater oxyanion contamination.

[1] Smedley, P. L.; Kinniburgh, D. G. (2017). *App. Geochem.* 84: 387-432.