Correlation of Traditional Water Quality Parameters with Metal Concentrations in Permeable Pavement Infiltrate

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EPA constructed a 4,000-m^2 parking lot for research and demonstration of three permeable pavements [permeable interlocking concrete pavers (PICP), pervious concrete (PC), and porous asphalt (PA)] at the Edison Environmental Center in Edison, NJ in 2009. Infiltrate samples from each permeable pavement were analyzed for 22 metals along with traditional water quality parameters [pH, chloride (Cl), total organic carbon (TOC), and suspended solid concentration (SSC)] from January 2010 to October 2015. Regression models were calculated to determine whether metal concentrations in permeable pavement infiltrate were associated with water quality parameters.

Most metal concentrations in the permeable pavement infiltrate had limited or no association with water quality parameters. However, some of metals did associate with specific parameters: Al and Mg concentrations (dissolved) showed relatively strong association with pH. Dissolved Ba, Ca, Cr, K, and Sr concentrations in all three permeable pavement infiltrates, and Mg concentrations in PICP infiltrate were moderately associated with Cl concentrations, whereas Na concentrations (dissolved) in all permeable pavement infiltrate were strongly associated with Cl concentrations. The association between dissolved metal and Cl concentrations was weaker for PC infiltrates than PICP or PA infiltrates. Ba, Cr and K were not detected in deicing salts applied in this research. Total concentrations of Cr, Cu, K and V in PA infiltrates, and of Cr, Si and V in PC infiltrates showed moderate association with TOC concentrations. Al and Fe concentrations (total) in surface runoff had strong association with SSC while Al, Cu, Fe, Mg, Mn, Si in PICP infiltrates, and Al, Ca, Sr in PA infiltrates had moderate association with SSC.