

Assessment of Heavy Metal Pollution in Urban Park Soils in Newark, New Jersey

SUAH YEKEH, PHD¹ AND ASHAKI A ROUFF²

¹Rutgers University- Newark

²Rutgers University-Newark

Presenting Author: sy480@scarletmail.rutgers.edu

This study investigated heavy metal concentrations in urban park soils in Newark, New Jersey, U.S.A. Seven parks located in mixed residential, commercial, and industrial zones were selected for evaluation. Arsenic (As), cobalt (Co), and lead (Pb) concentrations in surface (S1, 0-3 cm) and near-surface (S2, 4-7 cm) soils in high-traffic park areas were analyzed by portable X-ray fluorescence spectroscopy (pXRF). The pollution status of park soils relative to background concentrations in New Jersey soils was determined by calculating the contamination factor (CF), enrichment factor (EF), and geoaccumulation index (Igeo). Results indicated that five parks were highly polluted with respect to Pb and As in both S1 and S2 layers, with minimal Co pollution in most parks. Concentrations were also compared to the New Jersey Department of Environmental Protection (NJDEP) remediation standard for residential soils. The percentage of samples exceeding the NJDEP limit for Pb (58%) > As (50%) > Co (35%), with more of these samples located in the S1 layer. Select soils in exceedance of the NJDEP limit were subject to sequential extraction using the Tessier method to determine metal fractionation. Extractants were analyzed by inductively-coupled plasma optical emission spectroscopy (ICP-OES) for extracted metal concentrations. Results indicated that most As, and Pb were associated with the reducible fraction dominated by Fe/Mn oxides (70%), followed by the exchangeable fraction bound to particle surfaces (20%). Pb was also detected in the acid-soluble carbonate (5%) and oxidizable organic matter (5%) fraction for select samples. Metal fractionation indicates that As and Pb may have low mobility due to association with reducible phases. Overall, this research raises awareness of metal contamination in urban parks and contributes to knowledge of soil environmental quality in the city of Newark, New Jersey.