

Heavy metal concentrations in residential soils in the Halifax Peninsula, Nova Scotia: A pilot study*

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A number of possible natural, anthropogenic, widespread, or point source contaminants can cause high levels of heavy metals in soils. Coal burning, leaded paint and gasoline, and bedrock can all have a potential effect on the metals found in the soils of the Halifax Peninsula. The objectives of this pilot study were to: (1) determine the metal concentrations in the top 15 cm of soil in approximately 120 samples from over 30 residences on the Halifax Peninsula; (2) establish which, if any, metals have concentrations above CCME (Canadian Council of Ministers and the Environment) guidelines for residential soils; (3) investigate the difference in metal concentrations between the house dripline, roadside, and “ambient” samples; and (4) assess the geographic distribution of elevated levels of metals. Samples were sieved to <1 mm and were analyzed using a portable XRF. Potentially toxic metals analyzed and included in this study are: Pb, As, Cr, Cu, Zn, Ba, V, Cd, Co, Se, Mo, and Sn. Cadmium, V, Co, Se, Mo, and Sn had only rare values above CCME guidelines for residential soils; however, levels of Pb, As, Cr, Cu, Zn, and Ba varied from below guidelines to well above guidelines for individual samples.

Lead values ranged from 11–4869 ppm, with 81% of ambient values >140 ppm (CCME guideline). Copper values ranged from 15–381 ppm with 58% of ambient values above 63 ppm (CCME guideline). Zinc values ranged from 38–1778 ppm, with 45% of ambient values above 200 ppm (CCME guideline). Arsenic ranged from below detection to 245 ppm, with 94% of ambient values above 12 ppm (CCME guideline). Chromium values ranged from 31–218 ppm, with 71% of ambient values above 64 ppm (CCME guideline), and Ba ranged from 237–1209 ppm, with 32% of ambient values above 500 ppm (CCME guideline). The percentage of dripline samples above guidelines was greater than or equal to ambient percentages, whereas roadside values were consistently lower, but always with some samples above guidelines. The high values for dripline samples are consistent with the possible contributions of metals from paints in these older homes. It is proposed that the relatively high ambient values of metals are the result of a combination of bedrock, fill-related materials, and airborne pollutant contributions. Roadside values were lower than expected, and may be attributable to mobilization of these metals by chlorine from road salt.

****Winner of the AGS Rob Raeside Award for best undergraduate student poster***