

Lead (Pb): Upcoming Implications for Contaminated Site Soil Quality Guidelines

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Lead (Pb) is a substance that is present in the environment at elevated levels as a result of historical uses such as leaded gasoline and Pb solder in pipes. Pb is present at elevated concentrations in soil at contaminated sites. Recent epidemiological and laboratory data suggests that Pb may be causing a decrease in child Intelligence Quotient (IQ) and an increase in adult risk of coronary heart disease at current day body burdens of Pb, which will be reflected to some extent in an upcoming reevaluation of contaminated site guidelines in Canada.

Although Pb concentrations in soil, as well as Pb concentrations in the blood and bone of humans, have dropped considerably since the 1970s, concentrations remain orders of magnitude above pre-industrial levels and body burdens suggest concentrations may be within the adverse effects range. Published work suggests there is significant transfer of Pb from mother to neonate/ infant during pregnancy and breast feeding, suggesting infants, toddlers, and children may be particularly sensitive in terms of exposure from mothers that have historically accumulated Pb from the environment. Furthermore, toddler exposure to Pb in indoor dust sourced from contaminated soils may be a key route of exposure. These issues poses challenges for addressing Pb at contaminated sites since current day concentrations in background areas may be associated with elevated risks compared to pre-industrial exposures.

Key aspects of Pb risk to human health from soil exposures will be discussed within the context of contaminated sites. Furthermore, analytical techniques will be discussed that may significantly improve the accuracy of site-specific soil quality guidelines for Pb by providing an alternative to the application of default parameters.

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Mr. Knafla has worked as a toxicologist and risk assessor in Canada for 18 years. He obtained a B.Sc. in biochemistry a M.Sc. in Medical Sciences, and is a Diplomate of the American Board of Toxicology. Mr. Knafla has developed toxicological profiles and methods for deriving soil quality guidelines that have been applied at provincial and federal levels for substances including lead, arsenic, PAHs and hydrocarbon fractions, mercury, and salts. He has provided scientific consulting services to various industries, the Alberta Energy and Utilities Board, Alberta Environment, CCME, Environment Canada, and Health Canada.